BRUSSELS HAND/UPPER LIMB INTERNATIONAL SYMPOSIUM

Genval
Brussels, Belgium
January 30-31, 2015

HAND AND UPPER EXTREMITY SURGERY:
OPEN, MINI-OPEN OR ENDOSCOPIC PROCEDURES?

www.brusselshandsymposium.eu

PROGRAM
23rd BRUSSELS HAND/UPPER LIMB INTERNATIONAL SYMPOSIUM

HAND AND UPPER EXTREMITY SURGERY: OPEN, MINI-OPEN OR ENDOSCOPIC PROCEDURES?

January 30-31, 2015

CHÂTEAU DU LAC
GENVAL-BRUSSELS

DIRECTOR:

F. SCHUIND

DEPARTMENT OF ORTHOPAEDICS & TRAUMATOLOGY,
HÔPITAL ERASME, CLINIQUES UNIVERSITAIRES DE BRUXELLES,
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INTRODUCTION TO THE SYMPOSIUM

The 23rd edition of the annual Brussels/Genval Symposium will take place on Friday, January 30th and Saturday, January 31st 2015. The Symposium is dedicated to a specific interdisciplinary topic involving the upper limb. The 2015 edition will evaluate new, minimally invasive surgical procedures, to the established open operations. The Château du Lac at Genval will again be the beautiful venue for this symposium.

In the last decades, with the development of arthroscopy, arthroscopic instruments, tools and implants, and percutaneous bone fixation techniques, spectacular progress has been made in upper extremity minimally invasive procedures. At the shoulder, arthroscopic/endoscopic techniques have revolutionized the management of degenerative tendon lesions, and of glenohumeral and acromio-clavicular instability. Although the superiority of the minimally invasive techniques has not been clearly proven, arthroscopy has been widely adopted and has replaced open surgery as the standard of care. Arthroscopic surgery generates extra surgical costs – often including increased operative time - but allows reduced hospitalization and earlier return to work. Patients' satisfaction is high, especially when an early return to their active sportive or working activities is possible. When the entire operation cannot be performed arthroscopically, miniopen procedures allow achieving the desired surgical step without the morbidity of a large open approach. Children may as well benefit from endoscopic techniques, for gleno-humeral problems but also for torticollis and for anterior release in obstetric brachial plexus sequels – with the use of adapted equipment. Also septic arthritis is better treated by arthroscopic lavage and synovectomy. Could thoracic outlet liberation be the next milestone?

At the elbow, arthroscopic techniques have more recently emerged to, safely and without added morbidity, treat ankylosis, especially with moderate (patients still in the "functional" range of motion) and early osteo-arthritis. Olecranon bursitis, lateral epicondylitis, distal biceps tendon and ulnar nerve decompression/transposition procedures can now be performed by endoscopic techniques. Radial head and coronoid fractures can be fixed under arthroscopic control. Forearm fasciotomy or nerve decompression can be performed under endoscopic assistance. At the wrist, arthroscopy has revolutionized our knowledge of wrist articular anatomy and pathomechanics and has opened the path to many new treatment options. Arthroscopic ganglion removal, ligament suture, ligamentoplasty, carpal bone procedures, and resection and prosthetic arthroplasty can now be performed with minimal morbidity. New developments at the upper extremity include dry arthroscopy, minimally invasive surgery under sonographic, CT control or navigation, balloon osteoplasty, use of surgical robots, and virtual reality simulating devices for better teaching. Nowadays, the main limitations seem less and less technical, but are related to the remaining healing potential of the patients themselves (fatty degeneration after long-standing rotator cuff rupture, long standing scaphoid non-union in the context of smoking, etc). All minimally invasive techniques carry risks of iatrogenic lesions, particularly at the elbow, although these risks are well identified and often preventable. It is therefore essential to establish our surgical indications on a consensual basis. It is also essential to independently assess the clinical outcomes of our procedures with these new techniques.

The primary goals of the Brussels/Genval annual upper limb Symposium are to promote the exchange of ideas, to establish guidelines on a consensual basis, and to foster collaborative investigations among various specialists in all fields related to patient care. Much time will be set aside for the discussions.
SPECIFIC AIMS
• To summarize the current progresses and new ideas in minimally invasive upper extremity surgery; to evaluate new techniques, new concepts, surgical techniques, and evaluation of the results;
• To assess – also in the patient’s perspectives - the innovative techniques, the clinical results and the complications and to compare these new techniques to established classical surgical procedures, determining advantages and drawbacks;
• To assess sensibility and specificity in minimally invasive surgical technique, in the light of modern imaging;
• To evaluate the additional costs or economies, within the frame of cost controls of daily medicine;
• To formulate, on these bases, recommendations to the medical community;
• To discuss unsolved problems and possible solutions;
• To explore future directions of research.

F. Schuind
Erasme University Hospital, Brussels, Belgium
ORGANIZING COMMITTEE

PROGRAM DIRECTOR
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K. Cermak (Brussels, Belgium)
W. El Kazzi (Brussels, Belgium)
F. Moungondo (Brussels, Belgium)
R. van Riet (Deurne and Brussels, Belgium)

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J. Bahm (Brussels, Belgium and Aachen, Germany) E. Moest (Baudour, Belgium)
O. Barbier (Brussels, Belgium) F. Moungondo (Brussels, Belgium)
K. Cermak (Brussels, Belgium) F. Mulpas (Brussels, Belgium)
N. Cuylits (Brussels, Belgium) N. Pouliart (Brussels, Belgium)
L. De Smet (Leuven, Belgium) Ch. Robert (Brussels, Belgium)
I. Degreel (Leuven, Belgium) F. Schuind (Brussels, Belgium)
K. Drossos (Brussels, Belgium) O. Snoeck (Brussels, Belgium)
P.-M. Dugailly (Brussels, Belgium) S. Sobczak (Brussels, Belgium)
C. Duysens (Libramont, Belgium) L. Van Overstraeten (Tournai, Belgium)
W. El Kazzi (Brussels, Belgium) R. van Riet (Deurne and Brussels, Belgium)
V. Feipel (Brussels, Belgium) A. Van Tongel (Ghent, Belgium)
F. Handelberg (Brussels, Belgium) O. Verborgt (Antwerp, Belgium)
Ph. Hernigou (Paris, France) F. Verstreken (Deurne, Belgium)
P.C. Ho (Hong Kong, People’s Republic of China) E. Vögelin (Bern, Switzerland)
M. Jayankura (Brussels, Belgium) L. Willemot (Ghent, Belgium)
INFORMATION FOR PARTICIPANTS

Welcome to Belgium. We hope that you had a pleasant journey and that your stay in Genval will be enjoyable. Please, read this important information.

BADGES
Your badge should be worn at all times.

OPENING HOURS OF THE REGISTRATION DESK
Friday, January 30, 2015: 07.30 - 17.00
Saturday, January 31, 2015: 07.30 - 17.00

LUNCHES
On Friday and on Saturday, lunch will be served at the Argentina Room. The price is included in the registration fee.

CONTINUING MEDICAL EDUCATION CREDIT
A certificate will be provided to interested participants. We will send the certificate to the participants who wish to receive this document, when available.

INFORMATION FOR PRESENTERS

We would like to draw your attention to the following points:

- The allocated time of presentation should be strictly respected.
- The standard presentation format is by computer. The audiovisual projection system in the meeting room will include a Personal Computer (PC) along with PowerPoint for Windows and USB port. Request to use any equipment other than this must be arranged at the presenter’s expense.

Each presenter should check with the technician 20 min before the session, and introduce himself to the moderators of the session. The technician will be available in the meeting room from 07h45 on both congress days. There will be a laser pointer at your disposal.

SOCIAL PROGRAMME

Friday, 30 January 2015
Visit to the Belgian Comic Strip Center (Rue des Sables / Zandstraat 20, 1000 Brussels) - 18h30-23h00

An accomplished attraction located in the heart of Brussels, the Comics Art Museum has been honouring the creators and heroes of the 9th Art for more than 25 years. Tintin and the Smurfs lead the way towards adventures, an encounter with a world where creativity has no limits. Enhanced by an exceptional Art Nouveau home designed by Victor Horta in 1906, the Comics Art Museum is just as much a tribute to the pioneers as a glimpse of contemporary comics art.
Dinner will be served in the Horta Brasserie. Art Nouveau lovers as well as comic strips fanatics will be happy to take a break here, since it is a pleasure for the eye and the palate!
ACKNOWLEDGEMENTS

Frédéric Schuind, Director of the Symposium, and the Members of the Organizing Committee, gratefully acknowledge the following Authorities, companies and individuals for their precious support:

- the **FNRS** ("Fonds National Recherche Scientifique")
- **Companies**

**Gold Partners**
- Biomet Belgium
- Smith & Nephew
- Sprofit
- Zimmer

**Silver Partners**
- DePuy Synthes
- Eurox
- Stryker

**Bronze Partners**
- Scaffdex

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**SYMPOSIUM SECRETARIAT**

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FRIDAY, JANUARY 30, 2015

07.30 - 17.00 Registration

### 08.30 – 09.55 SESSION 1: AN INTRODUCTION TO THE SYMPOSIUM (1)

**Moderators: Ph. Hernigou, M. Jayankura**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenters</th>
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<tbody>
<tr>
<td>08.30</td>
<td>Opening Address</td>
<td>F. Schuind (Brussels, Belgium)</td>
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<tr>
<td>08.40</td>
<td>001 Cartilage Healing and Repair</td>
<td>D. Koulalis, F. Schuind (Brussels, Belgium)</td>
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<tr>
<td>08.55</td>
<td>Discussion</td>
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<td>09.00</td>
<td>002 When is an Open Shoulder Stabilization Procedure Indicated?</td>
<td>O. Verborgt (Antwerp, Deurne, Belgium)</td>
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<tr>
<td>09.15</td>
<td>003 Biologic Augmentation of Rotator Cuff Repair with Mesenchymal Stem Cells during Arthroscopy Increases the Rate of Healing: a Case Controlled Study</td>
<td>Ph. Hernigou, I. Guissou, J. Delambre, A. Poignard (Paris, France)</td>
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<td>09.30</td>
<td>004 Open vs Arthroscopic Anterior Release for Internal Shoulder Contracture in Obstetric Brachial Plexus Palsy</td>
<td>A. Aly, M.A.El-Abd, S.S. Fekry, M. Abouelsoud, N.A. Ghaly (Cairo, Egypt)</td>
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<tr>
<td>09.45</td>
<td>Discussion</td>
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<tr>
<td>09.55</td>
<td>Coffee-Break and Visit of the Commercial Exhibition</td>
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### 10.25 – 12.00 SESSION 2: AN INTRODUCTION TO THE SYMPOSIUM (2)

**Moderators: O. Barbier, N. Pouliart**

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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenters</th>
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</thead>
<tbody>
<tr>
<td>10.25</td>
<td>005 Safety of Elbow Arthroscopy</td>
<td>R. van Riet (Deurne, Brussels, Belgium)</td>
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<tr>
<td>10.40</td>
<td>006 Endoscopic Assisted Decompression of Median (other than Carpal Tunnel) or Radial Nerves in the Upper Arm</td>
<td>E. Vögelin (Bern, Switzerland)</td>
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<tr>
<td>10.55</td>
<td>Discussion</td>
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<tr>
<td>11.05</td>
<td>007 Role and Testing of Wrist Extrinsic Ligaments for the Diagnosis of the ScaphoLunate Instability</td>
<td>L. Van Overstraeten, E.J. Camus, M. Shahabpour, J. Messina (Tournai, Belgium, Maubeuge, France, Brussels, Belgium and Milan, Italy)</td>
</tr>
</tbody>
</table>
11.20 008 Arthroscopic Surgery of Hand Joints  
P.C. Ho, E. Chow, W.L. Tse, C. Wong (Hong Kong, China)

11.35 009 Upper Extremity Surgery under Sonographic Guidance – Literature Review  
F. Mounyondo, F. Schuind (Brussels, Belgium)

11.50 Discussion

12.00 Lunch and Visit of the Commercial Exhibition

13.30 – 15.19 SESSION 3: NERVE DECOMPRESSION

Moderators: J. Bahm, K. Cermak

13.30 010 Arthroscopic Tenotomy of Pectoralis Minor for Thoracic Outlet Syndrome  
A. Van Raebroeckx, P. Ruette, L. Beckers (Bonheiden, Belgium)

13.38 Discussion

13.43 011 Minimal Invasive Surgery in Compression Neuropathy: Endoscopic Carpal Tunnel Release, Ulnar Nerve Decompression and Medial Epicondylectomy  
P.C. Ho (Hong Kong, China)

13.53 012 Limitations of Endoscopic Decompression of Ulnar Nerve at the Elbow  
E. Vögelin (Bern, Switzerland)

14.03 Discussion

E. Kahhaleh, R. Matasa, A. Bragin, D. Faraoni, B. Dachy, A. De Mey (Brussels, Belgium)

14.21 014 Open versus Endoscopic Carpal Tunnel Release: who benefits from what!  
B. Staelens, L. Van Overstraeten, C. Goorens, J. Goubau (Brussels, Bruges, Tournai, Tienen, Belgium)

14.29 Discussion

14.39 015 Neurodynamics Mobilization Techniques of the Upper Limb: from Theory to Clinical Applications  
S. Sobczak, T. Marichal, K. Gilbert, P.M. Dugailly (Brussels, Belgium)

14.54 Discussion

14.59 016 Chronic Exertional Compartment Syndrome of the Forearm in Motocross Racers: Open, Mini-Open or Endoscopic Fasciotomy ?  
O. Barbier (Brussels, Belgium)

15.14 Discussion

15.19 Coffee-Break and Visit of the Commercial Exhibition

10
15.45 – 17.06 SESSION 4: DUPUYTREN AND HAND TENDONS

Moderators: K. Drossos, E. Vögelin

15.45 017 Minimal Invasive Treatment of Dupuytren Disease
I. Degreep (Leuven, Belgium)

16.00 018 Non-Operative Treatment of Dupuytren’s Disease
N. Cuylits, J-P. Moermans (Brussels, Belgium)

16.15 019 Collagenase Outcomes in a Single Unit
F. Marlborough, W. Bhat, A. Al-Mousawi, J. Auyeung, P. Sugden, M. Erdmann
(North Durham, United Kingdom)

16.23 Discussion

16.33 020 Trigger Fingers: What’ New?
K. Drossos (Brussels, Belgium)

16.48 021 Efficacy of Steroid Injections in Trigger Finger Injections
K. Sigamoney, C. Coapes (Middlesbrough, United Kingdom)

16.56 Discussion

17.06 – 18.00 SESSION 5: HAND AND UPPER EXTREMITY SURGERY: OPEN, MINI-OPEN OR ENDOSCOPIC PROCEDURES?
CASE PRESENTATIONS

Moderator: F. Moungondo

18.30-23.00 Social Program: Visit to the Belgian Comic Strip Center and Dinner
SATURDAY, JANUARY 30, 2015

08.30 – 09.51 SESSION 6: SHOULDER (1)

Moderator: A. Van Tongel, F. Moungondo

08.30 022 Coraco-Clavicular Fixation using the Tight-Rope® System after Lateral Third Clavicle Fractures or Acromio-Clavicular Joint Dislocations: Functional and Isokinetic Evaluation
N. Bloemers, K. Cermak, F. Schuind (Brussels, Belgium)

08.38 Discussion

08.43 023 Rationale for the Arthroscopic Approach of Acromio-Clavicular Disorders
F. Handelberg (Brussels, Belgium)

08.58 024 Arthroscopic Acromio-Clavicular Resection – How I do it
Fl. Mulpas (Brussels, Belgium)

09.13 025 Results of Arthroscopic Acromio-Clavicular Resection - Retrospective Study
E. Moest, O. Bath (Baudour, Belgium)

09.21 Discussion

09.31 026 Cuff Repair: Should I Repair it Open, Mini-Open or Arthroscopic?
A. Van Tongel, L. De Wilde (Ghent, Belgium)

09.46 Discussion

09.51 Coffee-Break and Visit of the Commercial Exhibition

10.20 – 12.29 SESSION 7: SHOULDER (2)

Moderators: F. Handelberg, Fl. Mulpas

10.25 027 “À la carte” Treatment of Anterior Shoulder Instability: an Evolution of Treatment of Anterior Shoulder Instability over a 17 year Period in a Specialized University Orthopeadic Department
Ch. Duysens, P. Boileau (Libramont, Belgium and Nice, France)

10.40 028 Open versus Arthroscopic “Bankart” Repair for Shoulder Instability
N. Pouliart (Brussels, Belgium)

10.55 029 Bone Block Procedures for Shoulder Instability: a Biomechanical Perspective
L. Willemont, O. Verborgt (Ghent, Deurne, Belgium)
Effect of Different Techniques of Non-Anatomical Repair of Anterior Shoulder Instability (Latarjet Procedure) on Patient's Response to Rehabilitation
H. Ali, K. Ayad, A. Rehan, W. Awadallah (Cairo, Egypt)

Discussion

Locked Posterior Shoulder Fracture Dislocation – a Review of 12 Cases
K. Sigamoney, D. Burton (Darlington, United Kingdom)

Discussion

Percutaneous Treatment of Humeral Head Osteonecroses by Stem Cells Injection
Ph. Hernigou, I. Guissou, J. Delambre, A. Poignard (Paris, France)

Discussion

Percutaneous Humeral Derotational Osteotomy in Obstetrical Brachial Plexus Lesions - Technique and Functional Results
A. Aly, P. Salvia, V. Feipel, J. Bahm, F. Schuind (Brussels, Belgium)

To Evaluate the Accurate Location of Bone-Block and Screws with Arthroscopic Latarjet Procedure
O. Flamand, J. Kany, R. Guinand, P. Croutzet (Mons, Belgium, Toulouse, France)

3D Upper Limb Motion Analysis in Obstetrical Brachial Plexus Lesions
P. Salvia, A. Aly, V. Feipel, F. Schuind, J. Bahm, S. Van Sint Jan (Brussels, Belgium)

Discussion

Arthroscopic Treatment of Mason II Fractures of the Radial Head
F. Michels, N. Pouliart, F. Handelberg (Brussels, Kortrijk, Belgium)

Discussion

New Anatomical Knowledge of Upper Extremity Fascia and Aponeuroses
O. Snoeck, S. Van Sint Jan, B. Beyer, P. Salvia, J. Coupier, V. Feipel, M. Rooze (Brussels, Belgium)

Endoscopic Treatment of Distal Biceps Rupture
O. Dhollander, E. Van Hoecke, R. van Riet (Deurne, Brussels, Belgium)

13.10 – 14.40 SESSION 8: ELBOW

Moderators: I. Degreef, R. van Riet

Arthroscopic Treatment of Mason II Fractures of the Radial Head
F. Michels, N. Pouliart, F. Handelberg (Brussels, Kortrijk, Belgium)

Discussion

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<tbody>
<tr>
<td>13.50</td>
<td>Discussion</td>
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<tr>
<td>14.00</td>
<td>Ulnohumeral Elbow Arthroplasty: Arthroscopy versus Mini-Open</td>
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<td>I. Degreef (Leuven, Belgium)</td>
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<tr>
<td>14.10</td>
<td>Arthroscopic versus Open Elbow Arthrolysis</td>
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<td>I. Degreef (Leuven, Belgium)</td>
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<td>14.20</td>
<td>Lateral Collateral Ligament Repair, Arthroscopic and Open Techniques</td>
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<td>R. van Riet (Deurne, Brussels, Belgium)</td>
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<td>14.30</td>
<td>Discussion</td>
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### 14.40 – 16.37 SESSION 9: WRIST (1)

**Moderators: L. De Smet, P.C. Ho**

<table>
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<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>14.40</td>
<td>Arthroscopy of the Wrist: the Pellenberg Experience of 25 Years</td>
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<td></td>
<td>L. De Smet, I. Degreef, M. Vannuffel (Leuven, Belgium)</td>
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<tr>
<td>15.00</td>
<td>Discussion</td>
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<tr>
<td>15.05</td>
<td>Arthroscopic Reconstruction of the S-L ligament in the III-IV Lesions of Geissler’s Classification: a New Way</td>
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<td>N. Della Rosa, M. Abate, A. Russomando, A. Landi (Modena, Italy)</td>
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<tr>
<td>15.13</td>
<td>Arthroscopic Palpation of the Extrinsic Ligaments of the Wrist: what do we really Palpate?</td>
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<td>E.J. Camus, L. Van Overstraeten (Maubeuge, France and Tournai, Belgium)</td>
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<tr>
<td>15.21</td>
<td>Arthroscopical CapsuloLigamentous Repair</td>
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<td>L. Van Overstraeten, E.J. Camus (Tournai, Belgium and Maubeuge, France)</td>
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<tr>
<td>15.31</td>
<td>ScaphoLunate Stabilization by Dynamic Extensor Carpi Radialis Longus Tenodesis</td>
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<td>W. El Kazzi (Brussels, Belgium)</td>
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<td>15.46</td>
<td>Discussion</td>
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<td>15.56</td>
<td>Arthroscopic Assisted Four Corner Fusion</td>
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<td>E.M. Baur (Murnau, Germany)</td>
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<tr>
<td>16.04</td>
<td>Three Corner InterCarpal Arthrodesis</td>
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<td>M. Colman, W. El Kazzi, P. Salvia (Brussels, Belgium)</td>
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<tr>
<td>16.12</td>
<td>Discussion</td>
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<tr>
<td>16.22</td>
<td>Arthroscopic Osteochondral Grafting at the Wrist</td>
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<td>P.C. Ho, W.L. Tse, C. Wong (Hong Kong, China)</td>
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<tr>
<td>16.32</td>
<td>Discussion</td>
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</tbody>
</table>
16.37     Coffee-Break and Visit of the Commercial Exhibition

17.00 – 18.09 SESSION 10: WRIST (2)

Moderators: W. El Kazzi, L. Van Overstraeten

17.00  050  Arthrosocpal Debridment and Grafting of Intra-Osseous Ganglia of the Lunate
        C.K. Goorens, S. Geeurickx, B. Staelens, Th. Scheerlinck, J. Goubau (Tienen, Brussels, Belgium)

17.08     Discussion

17.13  051  Minimally Invasive Treatment of Scaphoid Fractures and Nonunions
        F. Verstreken (Deurne, Belgium)

17.28     Discussion

17.33  052  Comparison of Bioreplaceable Joint Prosthesis with Trapeziectomy and AbLP Arthroplasty in the Treatment of the Osteoarthrosis at the CMCj level. A Randomised Parallel Groups Study in Adult Subjects
        N. Della Rosa, A. Leti Acciaro, A. Marcuzzi, A. Landi (Modena, Italy)

17.41  053  Physiotherapy in Trapezio-Metacarpal Osteo-Arthrosis
        Ch. Robert (Brussels, Belgium)

17.51     Discussion

17.56 – 18.20 SESSION 11: HAND AND UPPER EXTREMITY SURGERY: OPEN, MINI-OPEN OR ENDOSCOPIC PROCEDURES?
SUMMARY AND CONCLUSIONS

Moderators: J. Bahm, R. van Riet

17.56     Ten Questions to the Floor and the Faculty

18.10     Summary and Conclusions
        F. Schuind, A. Aly, J. Bahm, W. El Kazzi, F. Moungondo, R. van Riet
        (Brussels, Deurne, Belgium)

18.20     End of Symposium
ABSTRACTS
SESSION 1: AN INTRODUCTION TO THE SYMPOSIUM (1)

001 Cartilage Healing and Repair  
D. Koulalis, F. Schuind (Brussels, Belgium)

002 When is an Open Shoulder Stabilization Procedure Indicated?  
O. Verborgt (Deurne, Belgium)

003 Biologic Augmentation of Rotator Cuff Repair with Mesenchymal Stem Cells during Arthroscopy Increases the Rate of Healing: a Case Controlled Study  
Ph. Hernigou, I. Guissou, J. Delambre, A. Poignard (Paris, France)

004 Open vs Arthroscopic Anterior Release for Internal Shoulder Contracture in Obstetric Brachial Plexus Palsy  
A. Aly, M.A.El-Abd, S.S. Fekry, M. Abouelsoud, N.A. Ghaly (Cairo, Egypt)
Hyaline cartilage consists 80% by water, 1% by chondrocytes which reside within a matrix of 19% proteoglycans and collagen mainly (90 %) type II. It is avascular and aneural.

It can be divided in 4 zones, in accordance with the orientation of the collagen fibers of each zone:
Zone I : tangential, zone II:Oblique, zone III: Vertical, zone IV : vertical .
The zones are followed by the subchondral bone.
Cartilage healing is a process which encounters many difficulties due to the acellularity of the tissue.

The restoration process depends on the thickness of the lesion of the cartilage and this influences the end result and the future of the joint.

In partial thickness type of lesions concerning damage of the 4 zones only there is no inflammatory reaction. The site of the damaged articular surface undergoes a cascade of changes in an effort to cover the defect ending in irregular distribution of matrix and collagen type II and irregular fibrous tissue which can lead to a dissociation of the matrix within 6 months.

In full thickness tears where there is a lesion of the zones and additionally of the subchondral bone the development of a blood clot at injury site produces a fibrovascular type of repair tissue which carries mesenchymal stem cells and growth factors leading to the synthesis of a fibrocartilaginous tissue consisting mainly by collagen type I which can provide some temporary coverage of the defect and can assist in the distribution of the weight bearing forces but has no durability.

This leads to focal degenerative changes of the joint with degradation of the hyaline cartilage and to the development of osteoarthritis.

Articular surface reconstruction is a procedure which underwent many changes in the last years, in an effort to produce a new articular surface with a tissue as close as possible to the properties of articular cartilage in order to sustain the integrity of the joint.

Procedures like subchondral drilling, microfractures, abrasion arthroplasty are relying to the indirect coverage of the defect through the production of a blood clot containing the biological factors necessary for the formation of the coverage tissue. The combination of these methods with bioabsorbable scaffolds has added some advantages to these methods but did not change the histological result concerning the quality of the produced tissue.

The direct coverage of the lesion with osteochondral autografts or allografts provides immediate coverage with formed hyaline cartilage avoiding the dependency and unknown factor on the development of lesser quality tissue.

Tissue engineering with cultivation of either stem cells or chondrocytes pushed the procedures towards the direction of direct coverage. Articular surface reproduction is induced with cells taken by the patient cultivated in vitro and reinserted to the patient in larger numbers. This biological way of joint reconstruction overcomes the disadvantages of the former direct methods of treatment and provides on site the means for the synthesis of a tissue of potentially better quality.

Cartilage injury is a condition which presents the future of the knee joint. It is a condition difficult to confront due the diminished reparative possibilities of this type of tissue.

The options of treatment of the past can provide temporary solutions but cannot endure the demands of the everyday living of the knee joint. The current options of treatment show very promising results and create great expectations for the future towards the effort of modern orthopaedics to prevent joint degeneration.
When is an Open Shoulder Stabilization Procedure Indicated?

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Recent studies show comparable results of arthroscopic shoulder stabilization techniques compared with the gold standard open Bankart reconstruction. Great technical advances and increasing surgeon experience have rendered pathology once deemed an indication for open surgery as treatable by arthroscopic means. With this movement toward a more universal application of all-arthroscopic techniques, we might consider the following question: Is there ever a need to open? To answer this question, we must first consider normal anatomy and then appreciate the contribution of deranged pathoanatomy to recurrent instability in each individual case. The most important issue is whether the shoulder can be stabilized through a soft tissue repair or a bony procedure. The surgeon must then determine whether this is best addressed via an arthroscopic or open technique. Arthroscopy, as compared with open stabilization procedures, holds the potential benefits of decreased morbidity rates, early functional rehabilitation, and improved range of motion. When a significant pathologic lesion contributes to recurrent instability and cannot be adequately addressed as a result of the limitations of current arthroscopic techniques or instrumentation, the surgeon should choose an open technique. On the basis of this principle, open coracoid transfers (i.e., Latarjet procedure) have proven their efficacy in functional outcome and return to sports with low recurrence rates in patients with sizable glenohumeral bone defects. Other complicating issues, such as attenuated capsule, humeral avulsion of the glenohumeral ligament lesions, cases of revision surgery, and collision or contact athletes, exist and warrant an open Latarjet procedure as well. When performing these bony procedures, great attention should be given to the surgical technique and position and fixation of the bone block to avoid complications such as hardware problems, recurrent instability or secondary arthritis. Arthroscopic techniques may offer potential advantages addressing these issues, but especially arthroscopic Latarjet procedures remain difficult and are prone to important complications. Arthroscopic isolated bone grafting techniques using auto- or allografts may potentially be technically easier and may have an important value in well-defined indications. In this presentation, a comprehensive review of current open and arthroscopic techniques for anterior shoulder instability will be given.
Purpose: The purpose of this study was to compare the imaging outcomes of mesenchymal stem cells (MSCs) augmentation in arthroscopic rotator cuff repair with analysis of the effect on magnetic resonance imaging (MRI).

Methods: 45 patients in the study group received concentrated bone marrow mesenchymal stem cells with single-row rotator cuff repair at the time of arthroscopy. In the study group associated with MSCs biologic augmentation, bone marrow aspiration was performed after installation of the patient in a beach-chair position and before arthroscopy bone marrow harvesting was done on the anterior iliac crest. A volume of 150 mL of marrow (that could be concentrated after) was aspirated from the anterior crest. The buffy coat containing progenitor cells was returned in the operative room after 30 minutes. Single-row repair was used in this period, suture anchors were placed on the lateral edge of the greater tuberosity. Sutures from these anchors were passed sequentially through the supraspinatus tendon in a simple fashion from anterior to posterior using a suture passing instrument. These sutures were then tied sequentially from posterior to anterior using arthroscopic sliding square knots. Injection of MSCs was performed at the end of rotator cuff fixation. MSCs were injected in the tendon at the junction bone tendon (4 mL), in the bone and at the site of the footprint (8 mL). The postoperative rotator cuff integrity was evaluated by magnetic resonance imaging at 3, 6-month and minimum 10-year follow-up. The results were compared to those of a control series of patients who did not received MSCs.

Results: Bone marrow injection improved the repair process on ultrasound and MRI. Forty-two (93%) of the 45 single-row repairs with MSCs augmentation healed at 6 months in the study Group and 30 (67%) of the 45 single-row repairs healed in the control Group without MSCs. Bone marrow injection prevented further ruptures during the next ten years; Between one year and the 10 years follow-up, 13 other tears had occurred among the 90 patients. Intact rotator cuffs were found in 39 (87%) of the 45 patients in the MSCs Group and in 20 (44%) of the 45 patients in the control group at the most recent follow-up of ten years.

Conclusion: this study showed that significant improvement in imaging outcomes could be achieved by MSCs augmentation technique at a minimum 6 months follow-up. Our study showed that the durability of the repairs was also different over time between the two groups with some protection in the MSCs group.
Open vs Arthroscopic Anterior Release for Internal Shoulder Contracture in Obstetric Brachial Plexus Palsy

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Background
Internal rotation contracture due to muscle imbalance is the most common deformity in obstetric brachial plexus palsy (OBPP). Persistence of contracture hinders normal shoulder development. The goals of treatment are improvement of range of motion, stable concentric glenohumeral articulation, and balanced muscles, which could provide an opportunity for joint remodelling. Reduction of the glenohumeral joint in young children needs considerable capsular and subscapularis muscle release with or without tendon transfers. Contracture release can be either performed through open or arthroscopic techniques.

Purpose
We present a retrospective study comparing open versus arthroscopic release for shoulder contracture treatment in OBPP with or without tendon transfers.

Methods
Over a four years period, twenty-one patients who presented with internal shoulder contracture secondary to OBPP before the age of 6 years have been included in our study. Eleven patients with mean age 4 years were treated by open release and tendon transfers while 10 patients with mean age 3 years were treated through arthroscopic release with or without tendon transfers. Postoperatively, patients who benefited from tendon release were immobilized in a cast in external rotation for 6 weeks, while those who did not were immobilized for 4 weeks. Physical therapy was then initiated with night bracing in external rotation for another 4 weeks.

Results
All patients were available for follow-up, and all have completed a minimum of one year clinical follow-up. There was no intra- or postoperative complications. All patients had a centered position of the glenohumeral joint at the time of surgery. A significant increase in the active external rotation was observed in the two groups. But regarding the active internal rotation, marked loss was noted in nearly 35% of patients treated by open release and tendon transfers while no significant loss was noted in patients treated through arthroscopic release with or without tendon transfers.

Conclusions
Arthroscopic release for internal shoulder contracture allows for selective release for the subscapularis muscle and the anterior capsule in contrast to the open release that requires release of multiple superficial structures as well, which could potentially led to anterior dislocation of the glenohumeral joint and/or functionally significant external rotation contractures.
SESSION 2: AN INTRODUCTION TO THE SYMPOSIUM (2)

005 Safety of Elbow Arthroscopy
R. van Riet (Deurne, Brussels, Belgium)

006 Endoscopic Assisted Decompression of Median (other than Carpal Tunnel) or Radial Nerves in the Upper Arm
E. Vögelin (Bern, Switzerland)

007 Role and Testing of Wrist Extrinsic Ligaments for the Diagnosis of the Scapholunate Instability
L. Van Overstraeten, E.J. Camus, M. Shahabpour, J. Messina (Tournai, Belgium, Maubeuge, France, Brussels, Belgium and Milan, Italy)

008 Arthroscopic Surgery of Hand Joints
P.C. Ho, E. Chow, W.L. Tse, C. Wong (Hong Kong, China)

009 Upper Extremity Surgery under Sonographic Guidance – Literature Review
F. Moungado, F. Schuind (Brussels, Belgium)
Arthroscopy of the elbow has become a common procedure. However, compared to other joints, it remains to be a relatively risky procedure. It is important to realize that there is a learning curve involved. At the beginning of the curve, diagnostic scopes are very useful to gain experience in doing a systematic check of all structures in the elbow. Later on, simple procedures will be followed by more complex arthroscopic surgery. Whatever the procedure, the basics stay the same.

The arthroscopy starts with setting the indication. There are not many contraindications for arthroscopic surgery. The general health of the patient, inability of the surgeon to perform a safe arthroscopy may be reasons not do an arthroscopy. Relative contra-indications include multiple prior surgeries to the elbow or anterior transposition of the ulnar nerve. The indication is often confirmed by an examination, under total anesthesia. Subtle instability for example, can become more clear.

A tourniquet with a pressure of 250 mmHg is used, and the patient is placed in lateral decubitus. Some surgeons prefer a prone or supine position, which are both possible. The arm is placed on a support. Care should be taken not to compress the antecubital area, as this will push the neurovascular structures into the operating field. When the arm is placed properly, the tourniquet rests on the support. The arm is prepped and draped. The ulnar nerve is palpated and marked with a surgical marker. Other landmarks, such as the epicondyles, olecranon tip and radial head can be marked as well.

The capsule is then distended by injection approximately 25 ml of physiological fluid into the joint. Typically, this is done through the soft spot, in the radiohumeral gutter. The soft spot is identified as the center of a triangle formed by the radial head, lateral epicondyle and olecranon tip. It is important to realize that insufflations will increase the distance between the neurovascular structures and the portals, but not the distance between the nerves and the capsule. The neurovascular structures will therefore still be close to the capsule and this is important when working on the capsule.

The proximal anteromedial portal is the first portal. It is located 2 cm proximally from the medial epicondyle and one cm anteriorly to the intermuscular septum. Only the skin is incised, so that the medial cutaneous nerves are not disturbed. The intermuscular septum is palpated with the tip of the trocar and the trocar is advanced anteriorly to it, in the direction of the radial head. The humerus is felt on the posterior aspect of the trocar and the anterior capsule is penetrated. The first intra-articular view is that of the radiohumeral joint and the lateral capsule. Tearing of the lateral capsule can sometimes be seen in cases of severe lateral epicondylitis. The camera is then angled at the coronoid and the ulnohumeral joint. From there, the coronoid and radial fossae are visualized and finally the camera is turned, so that the anterior capsule can be seen. A lateral working portal can be made if a therapeutic procedure is necessary. The lateral portal is made with the use of a needle. The position of the needle is confirmed under direct arthroscopic view. The more proximal the lateral portal is, the safer it is. When this portal is made more distal, it becomes closer to the radial nerve. Additional portals can be made, to introduce retractors or other instruments into the anterior joint space.

Once the anterior part of the procedure is complete, posterior portals are made. The first posterior portal is the lateral posterior portal. This portal is made proximal to the lateral tip of the olecranon. The camera is placed in the olecranon fossa and the tip of the olecranon is seen. From here the medial gutter can be inspected by moving the camera medially over the tip of the olecranon. Loose bodies can often be found in the medial gutter. Instability can be diagnosed or confirmed if the medial ulnohumeral opens during valgus stress or the pivot shift test. If a working portal is necessary it is made medial to the lateral posterior portal and slightly proximal. The ulnar nerve is palpated while creating the portal, so its position is clear and the nerve is protected during the incision.

Finally the camera is moved into the radial gutter. This is sometimes technically somewhat challenging, especially at the beginning of the learning curve. The tip of the olecranon is followed laterally until the ulnohumeral joint can be seen from the lateral side. The arm is then gently extended and the camera is advanced into the radial gutter. A bare area, without cartilage, is usually seen on the proximal ulna. This is not pathologic and is present in over 90% of people. There is often some synovial tissue that obstructs the view of the posterior aspect of the radial head. A soft spot portal is made. A needle is placed into the soft spot and its position is verified with the scope. Shavers, retractors and other instruments can be introduced through the soft spot portal. Posterolateral rotatory instability can be diagnosed by performing the pivot shift test. In a positive test, the lateral ulnohumeral...
joint opens and the camera can be ‘driven through’ to the medial gutter. A plication of the lateral collateral ligament can easily be performed if it is felt that this will be sufficient.

At the end of the procedure, the elbow is examined again, with specific attention to the range of motion. The elbow is then immobilized in a posterior plaster splint. Extension is the maximum closed packed position of the elbow and is used to force the fluid used during the arthroscopy out of the joint. After the patient has woken up, the neurovascular status is carefully checked, and the patient is discharged from the hospital. The posterior splint is removed at the first postoperative day, at which point mobilization of the elbow is encouraged.

This sequence of events should be followed for simple as well as complex arthroscopic procedures. This will minimize the risk of complications and maximize the outcome. Arthroscopic surgery of the elbow is a very important tool for the elbow surgeon. With experience, more complex procedures will become possible, but the ‘basics’ will remain to be very important.
Endoscopic Assisted Decompression of Median (other than Carpal Tunnel) or Radial Nerves in the Upper Arm

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Indication
Besides carpal tunnel and cubital tunnel syndrome, other nerve compression or constriction syndromes exist in the upper extremity. Smaller incision techniques are getting more and more popular to decompress involved nerves (1). Using the technique of endoscopically assisted decompression such rare nerve compression syndromes can be released.

Materials and Methods
Between January 2011 and March 2012, six patients had endoscopically assisted surgery for rare compression or hour-glass-like constriction syndromes in the upper extremity. This included eight decompressions: four proximal radial nerve decompressions, and two combined proximal median nerve and anterior interosseous nerve decompressions. Surgical technique and functional outcomes are presented (2,3).

Results
There were no intraoperative complications. Endoscopy allowed both identifying and removing all the compressive structures. In one case, the proximal radial neuropathy developed 10 years earlier without therapy and a massive hour-glass nerve constriction was observed intraoperatively which resulted in a concurrent complementary tendon transfer to improve fingers and thumb extension. Excellent results were achieved according to the modified Roles and Maudsley classification in five out of six cases. All but one patient considered the results excellent. The poorest responder developed a CRPS II and refused post-operative physiotherapy.

Conclusion
Endoscopically assisted decompression in rare compression syndrome of the upper extremity is highly appreciated by patients and provides excellent functional results. This minimally invasive surgical technique has the advantage to even treat a simple irritation of involved nerves without creating large wounds and scars.

Role and Testing of Wrist Extrinsic Ligaments for the Diagnosis of the ScaphoLunate Instability

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Introduction:
Scapholunate (SL) stability depends not only on the integrity of the interosseous ligament (SLIOL) but also on extrinsic volar (Radio-scapho-capitate (RSC) – Long Radio-Lunate (LRL) – Short Radio-Lunate(SRL)) and dorsal (Dorsal Radio-Carpal (DRC) – Dorsal Inter-Carpal (DIC)) ligaments, Scapho-Trapezo-Trapezoïdal ligaments and capsular attachments. Some of them, like the Dorsal capsule SL Septum (DCSS), are real anatomical structures. They constitute a true SL complex (SLC). The SL instability can be static, dynamic or predynamic according to the radiological aspect of the carpal bones. The Computed Tomographic Arthrography (CTA) is the gold standard of imaging of SLIOL and the Magnetic Resonance Arthrography (MRA) seems to give useful information about the integrity of secondary extrinsic stabilisers. After a symptomatic wrist sprain with a normal X-Ray, the prognostic depends on the quick diagnosis of instable SL ligamentous tear. We think important to assess the different components of this SL complex before to choose a procedure to repair.

Material and methods:
This lecture is based on two cadaveric and one clinical studies. Arthroscopical and fluoroscopic changes have been studied after sequential section of intrinsic and extrinsic ligaments on thirty tree cadaveric wrists (20 + 10). On hundred symptomatic and CTA (+) wrists, an arthroscopic testing of SLIOL and all accessible extrinsic ligaments has been performed.

Results:
In the first study, a stage EWAS 3A (table 1) was obtained when SL ligament’s volar and intermediate portion and/ or SC/LRL ligaments were sectioned. A stage 3C was obtained when posterior SLIOL was sectioned as well. A stage IV when the DIC was also sectioned. A stage 3B was obtained by cutting intermediate, posterior portion of the SLIOL ligament and DIC. A stage 3C was obtained when the anterior part of the SLIOL was also sectioned. In all cases, sectioning of the SLIOL lead to a stage 3C only if associated with sectioning of at least one of the extrinsic stabilizers (DIC or SC/LRL). Sectioning of DIC and SC ligament, in addition to SLIOL lead to an arthroscopic stage IV. When ST, DRC and TH ligaments were also sectioned significant radiological signs appeared (stage V).
In the second study, the sectioning of the DCSS provoked in all cases increasing of arthroscopic widening of SL space but not significant radiologic change.
The clinical study shows a significant correlation of the scapholunate predynamic instability with the severity of the laxity of the extrinsic stabilizers (p < .001). The SL predynamic instability is also correlated with lesion of the mid-carpal part of the Radio-Scapho-Capitate ligament (RSC) (p<.05).
Finally, it’s correlated with isolated lesion of the Dorsal Intercarpal Ligament (DIC) (p<.01).

Conclusions:
The EWAS new classification of arthroscopical SL instability specifies the 3rd Geissler stage depending on SL widening form. It’s influenced by the type of SLIOL and extrinsic ligament lesion. The DCSS could play a role of predynamic SL stabiliser. Near static imaging investigations, the arthroscopic testing of the extrinsic ligaments constituting the SL complex assesses the dynamic status of them and specifies the lesional spectrum of instability. We think that it’s necessary to treat wrist sprain according to the status of the SL complex to perform as complete a repair as possible.
Table I: Stages of scapholunate interosseous instability (EWAS).
<table>
<thead>
<tr>
<th>STAGE</th>
<th>ARTHROSCOPICAL FINDINGS</th>
</tr>
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<tbody>
<tr>
<td>Stage I</td>
<td>No passage of the probe in the interosseous Scapholunate (SL) space, but synovitis.</td>
</tr>
<tr>
<td>Stage II</td>
<td>Passage of the probe in the SL space without widening</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>Volar partial widening at dynamic instability test from MC joint (volar instability)</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>Dorsal partial widening at dynamic instability test from MC joint (dorsal instability)</td>
</tr>
<tr>
<td>Stage IIIC</td>
<td>Complete widening of the space at dynamic test</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Gap with passage of the arthroscope from MC to RC joint</td>
</tr>
<tr>
<td>Stage V</td>
<td>Gap with easy passage of the arthroscope from MC to RC joint and radiologic changes</td>
</tr>
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Figure 1: Arthroscopical testing of extrinsic ligaments components of SL complex in the volar and the dorsal sides
008 Arthroscopic Surgery of Hand Joints

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Though arthroscopy of finger joints was first described in 1979, its clinical application did not gain much popularity till late 90’s. It evolves as a new concept that allows better visualization of intra-articular pathology including articular cartilage, synovium and ligaments. This enables a better evaluation of the severity of the intra-articular pathology and thus rationalizes the choices of treatment. Arthroscopic surgery when performed properly produces minimal trauma to the peri-articular tendon, capsular and ligamentous structures, preserves better joint integrity and stability, induces less scarring and adhesion, creates less pain and thus enables earlier rehabilitation. A wide variety of treatments can be performed without the need of traditional open surgery. Many procedures can be performed as ambulatory surgery under portal site local anaesthesia without the need for a tourniquet. Patients’ safety and comfort can be enhanced. Arthroscope of small caliber such as 1.9mm and fine arthroscopic instruments sized under 2.5mm are mandatory. Finger pivoting technique in controlling arthroscopic instruments inside the joint should be adopted.

Thumb carpometacarpal joint arthroscopy was first described in detail by Menon and Berger in 1996 and 1997 respectively. Operation is performed typically over a traction tower to which the thumb is connected with a single plastic finger trap under a traction force of 5-8 lbs. The common portals in use are 1R, 1U and thenar portal. The bi-concave articular surfaces and most important ligament structures such as the anterior oblique ligament, posterior oblique ligament, ulnar collateral ligament and the dorso-radial ligaments can be appreciated. Basal joint osteoarthritis is the most common indication for surgery. Other indications include rheumatoid arthritis, Bennett’s fracture, post-traumatic arthritis and instability. Common procedures include synovectomy, removal of loose bodies, resection of osteophytes, thermal capsular shrinkage, to more complicated procedures such as arthroscopic assisted reduction of intra-articular fracture, hemi- or total trapeziectomy, interposition with tendon graft, artificial scaffold or pyrocarbon insert. Arthroscopy can also be performed in other carpo-metacarpal joints, such as the 4th and 5th CMCJ. Arthroscopic assisted fusion and fracture reduction has been reported.

Metacarpo-phalangeal joint arthroscopy was first being used regularly in rheumatoid hands by Vaupel in 1985. Traction force of 5-8 lbs is provided with a traction tower via a single finger trap applied to the affected digit. Two regular portals in use are the dorso-radial and dorso-ulnar portals just adjacent to the extensor tendon. The opposing articular surfaces, volar plate, both collateral ligaments and the associated joint gutters, dorsal capsule can be appreciated. Surgical indications include rheumatoid arthritis, osteoarthritis, post-traumatic arthritis, chronic pain of uncertain etiology, osteochondral lesion, intra-articular fracture, Stener lesion in thumb ulnar collateral ligament injury, volar plate instability, post-traumatic volar plate contracture, adhesion and septic arthritis. Therapeutic procedures include synovectomy, synovial biopsy, lavage and drainage, chondroplasty, volar plate release, volar plate thermal shrinkage, arthroscopic assisted reduction of Stener lesion, arthroscopic assisted fracture reduction and arthrodesis. Prophylactic protection of the FPL tendon with a plastic tubing sling is recommended when performing arthroscopic thermal shrinkage due to its proximity to the volar plate.

The proximal interphalangeal joint (PIPJ) had a small volume and very limited space, and the use of arthroscopy had never been popular. Sekiya et al were the first to describe in detail the surgical techniques and clinical applications of PIPJ arthroscopy in 2002, mainly in rheumatoid arthritis. As the joint cannot be adequately distracted open even on traction, the accessibility of the joint is limited to the dorsal capsular reflection area, and the radial and ulnar recesses along both collateral ligaments. The volar recess and the volar two-third of the joint cannot be reached arthroscopically. The best indication is when the offending pathology is mainly located over the dorsal aspect of the joint, such as in inflammatory arthritis, osteophyte and loose body formation. PIPJ arthroscopy can be done under digital nerve block. A finger tourniquet can be applied. Unlike CMCJ or MCPJ arthroscopy, no traction is needed. The hand should be placed on the operation table horizontally in a relaxed position with the interphalangeal joints slightly flexed and well supported. Portals used include the dorsoradial and the dorsoulnar portals. Entry site of the dorsal radial portal is radial to the central slip, 5-10 mm proximal to PIPJ joint line. Similarly the dorsal ulnar portal is located ulnar to the central slip at similar level. A
central transtendinous portal can be employed using a 18G needle for outflow purpose. Surgical procedures include synovectomy, osteophyte excision, removal of loose bodies and release of dorsal capsule and lateral gutter adhesion. Caution needs to be taken to avoid injury to the central slip insertion at the base of middle phalanx.
Upper Extremity Surgery under Sonographic Guidance – Literature Review

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Sonography was initially used exclusively by radiologists for diagnostic purposes and the improvement of sonographic resolution with the development of high frequency probes has increased the accuracy of this technique allowing best diagnosis performances particularly for upper limb pathologies. However, in the upper limb, another use of this technology has been developed not only for diagnosis but also for procedures and treatments of some pathologies and this technique is now used not only by radiologists but also by rheumatologists, anaesthesiologists and hand surgeons to perform accurate infiltrations, nerves block and minimally invasive and percutaneous surgery.

Sonographic guided surgery is actually mainly oriented on release procedure as well as treatment of carpal syndrome tunnel, trigger finger or tendon division for spastic muscular contractures. In vitro studies have revealed a good accuracy of these procedures with a short learning curve. Functional and kinematic assessments have already shown the in vivo efficiency of these techniques. Different surgical techniques have been described, using modified puncture needle, hook, basket punch or more complex specifically designed instruments to perform percutaneous releases.

Several studies have already described ultrasonography guided percutaneous carpal tunnel release of transverse carpal ligament with low complication rate and a high rate of complete release and some authors have described same or better clinical results after percutaneous sonographic guided carpal tunnel release than after classic procedure for key pinch and grip strength as well as for tenderness of the scar and post-operative pain.

Recently, an In vitro study has assessed the feasibility of sonography guided percutaneous ulnar nerve release at elbow with encouraging results showing no iatrogenic nerve lesion and a high rate of complete release with a short learning curve.

Some authors described an indication for adhesive capsulitis of shoulder percutaneously with sonography guided release of the rotator interval and the posteroinferior capsule by using a curved round needle with good short term outcome on pain range of motion and functional tests.

About trigger fingers, even when percutaneous sonography guided procedures allow a real minimal invasive surgery that could be performed at outpatient clinic, some authors have shown that physiotherapy is an important aspect of the post-operative management to improve functional results.

Sonography guided surgery in upper limb is a promising technique combining accuracy and efficiency with a low cost. Even if today these procedures remain limited to some specific indications, its use is rapidly spreading with time and many new indications and techniques will be likely developed in the next few years.
SESSION 3: NERVE DECOMPRESSION

010  Arthroscopic Tenotomy of Pectoralis Minor for Thoracic Outlet Syndrome
A. Van Raebroeckx, P. Ruette, L. Beckers (Bonheiden, Belgium)

011  Minimal Invasive Surgery in Compression Neuropathy: Endoscopic
Carpal Tunnel Release, Ulnar Nerve Decompression and Medial
Epicondylectomy
P.C. Ho (Hong Kong, China)

012  Limitations of Endoscopic Decompression of Ulnar Nerve at the Elbow
E. Vögelin (Bern, Switzerland)

013  Global Outcome after Carpal Tunnel Decompression: Comparison between
Simple Carpal Tunnel Release and the Release with Epineurotomy. Clinical and
Neurophysiological Study
E. Kahhaleh, R. Matasa, A. Bragin, D. Faraoni, B. Dachy, A. De Mey (Brussels,
Belgium)

014  Open versus Endoscopic Carpal Tunnel Release: who benefits from what!
B. Staelens, L. Van Overstraeten, C. Goorens, J. Goubau (Brussels, Bruges,
Tournai, Tienen, Belgium)

015  Neurodynamics Mobilization Techniques of the Upper Limb: from Theory to
Clinical Applications
S. Sobczak, T. Marichal, K. Gilbert, P.M. Dugailly (Brussels, Belgium)

016  Chronic Exertional Compartment Syndrome of the Forearm in Motocross
Racers: Open, Mini-Open or Endoscopic Fasciotomy?
O. Barbier (Brussels, Belgium)
010 Arthroscopic Tenotomy of Pectoralis Minor for Thoracic Outlet Syndrome

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Neurogenic pectoralis minor syndrome (NPMS) has been proven to be present in over half the patients with a clinical diagnosis of neurogenic thoracic outlet syndrome (NTOS). Its recognition is important as many patients with suspected NTOS can be treated successfully with a simple pectoralis minor tenotomy alone.

An arthroscopic release of the pectoralis minor is a low-risk and minimally invasive outpatient procedure.

We performed a review of the literature and describe the technique for a full arthroscopic tenotomy of pectoralis minor. We add 3 cases treated with this procedure.
Minimal Invasive Surgery in Compression Neuropathy: Endoscopic Carpal Tunnel Release, Ulnar Nerve Decompression and Medial Epicondylectomy

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Compression neuropathy of the upper limb commonly involves median nerve and ulnar nerve and is frequently associated with intrinsic pathology within the carpal tunnel and the cubital tunnel respectively. It is logical to employ minimal invasive approach to remove surgically the intrinsic causes to decompress the affected nerves, while to preserve the integrity of those uninvolved structures. The Chow’s two portal technique of endoscopic carpal tunnel release (ECTR) was first introduced to Hong Kong in 1993. We modified the cutting technique by employing the retrograde knife alone to divide the transverse carpal ligament in a distal-to-proximal manner. A prospective randomized controlled study comparing ECTR and open release conducted between Jun 1993 and Dec 1994 confirmed a significant reduction of post-op scar pain, scar related complications and earlier return to work in the ECTR group while both could reliably achieve symptom relief in 90% of patients. The endoscopic technique then became the standard of practice since 1994.

Limited Open Carpal Tunnel Release (LOCTR) system devised at the Indiana Hand Centre was adopted in Hong Kong in 1998. The author conducted another prospective randomized controlled study on 30 patients with bilateral carpal tunnel syndrome between July 1999 and August 2000 to compare efficacy between ECTR and LOCTR. Each patient underwent simultaneous bilateral carpal tunnel release with ECTR randomly allocated to one hand while LOCTR on the other. 95% of patients had significant resolution of symptoms in both methods. However, LOCTR group experienced significantly less scar tenderness and less pillar tenderness during early postoperative period. Subjective evaluation favoured LOCTR over ECTR. As a result, LOCTR gradually got upper hand in surgeons’ preference.

However incident happened after the completion of the study. We encountered one case of 70% median nerve transection and two cases of injury to FDS tendon of little finger. Careful evaluation revealed significant risk of damage to FDS tendon of little finger at the hook of hamate. The semi-blind nature of the cutting technique inevitably threatened the neurovascular structures. As confidence was lost, LOCTR then fell out of favour.

After summarizing the objective data and subjective experience acquired over the past 21 years, the author concludes that a properly and carefully conducted ECTR provided the best treatment option for patient with idiopathic CTS. High degree of alertness to anatomical structures at risk and meticulous attention to every single surgical detail appeared to be the key factor in ensuring surgical triumph in ECTR.

King and Morgan first described ulnar nerve decompression and medial epicondylectomy in 1959, as an alternative to transposition of ulnar nerve for more complete decompression of the ulnar nerve and a more durable relief of symptom. The technique allowed the nerve to migrate anteriorly to a newly relaxed position, choosing the path of least resistance without unnecessary devascularization as in anterior transposition. Studies showed that there was significant reduction of strain and also least impact on the excursion of the nerve as compared to other methods. We adopted the technique and philosophy of the treatment method since 2001. The operation can be done under plexus block or local anaesthesia. Small incision down to 3-4cm can be employed. A more posteriorly placed incision helps to avoid iatrogenic injury to the medial cutaneous nerve of forearm. With adequate undermining of wound edge and good soft tissue retraction, all potential offending structures to the ulnar nerve proximal and distal to the medial epicondyly can be visualized and released. The ulnar nerve should be minimally dissected on its posterior aspect to preserve the blood supply and to minimize the tendency for anterior migration of the nerve after decompression. The prominent part of the medial epicondyle of was removed with an osteotome from a distal-postero-medial to proximal-antero-lateral direction, avoiding damaging the medial collateral ligament. Bone cutting is adequate as long as there is no tension over the ulnar nerve at the medial epicondyle when the elbow is bent beyond 90 degree.
Usually 5-6mm slice of bone cut suffices. The periosteal should be tightly sutured to the flexor-pronator aponeurosis in a pant-over-vest manner to minimize bone bleeding and provide a smooth bed for nerve gliding. No immobilization is required after the surgery.

Our earlier review included 57 patients operated between 2001 and 2008. McGowan severity grading of I, II, III was noted in 17%, 13% and 70% of the patients. The mean follow up was 40 months. 70% of patients reported more than 50% improvement in numbness especially the relief of burning dysthesia. 67% of patients had overall satisfaction score more than 70 out of 100. Recurrence of hand numbness was reported in 4 patients, 2 possibly related to cervical and carpal tunnel problems. We conclude that ulnar nerve decompression and medial epicondylectomy is an effective mean to treat patient with cubital tunnel syndrome even in advanced stage.
Limitations of Endoscopic Decompression of Ulnar Nerve at the Elbow

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Background and objectives: Sulcus N. Ulnaris Syndrome (SNUS) is the second most common nerve compression syndrome in the upper limb after carpal tunnel syndrome. Since the pioneering work of Tsai et al., (1) endoscopically assisted decompression for SNUS has steadily improved. In a previous retrospective study on 55 patients, Leclère et al. (2) have discussed many advantages of the endoscopic technique. In this additional study, limitation of endoscopic decompression is summarized.

Material and Methods: The endoscopic ulnar nerve release is performed according to the technique by Hoffman and Simienow (3) using the Storz instrumentarium. A retrospective chart review of 42 patients operated over a 2-years period was done including 27 men and 15 women with an average age of 51 years at the time of surgery. The clinical diagnosis was always confirmed by a neurophysiological examination using nerve conduction studies and dynamic ultrasonography. According to the Dellon classification, 11 patients had mild, 19 had moderate, and 12 had severe SNUS. The mean follow-up time was 18 months (range 6-30 months).

Results: Sensibility was normalized in 69% of the patients. Compared to the contralateral non-operated side, the mean grip strength improved from 52% to 74% and the mean pinch grip from 64 to 81%. According to the modified Bishop rating system, 17 patients had excellent (40.5%), 12 patients good (28.5%), 5 patients fair (12%), and 8 patients bad results (19%). However, we observed 6 postoperative nerve luxations. Ultra-sonographically and clinically, these nerves were close to the edge of the medial epicondyle but did not luxate preoperatively. All were re-operated with conventional submuscular transposition resulting in improvement of the symptoms. Indirect cutaneous nerve injuries as part of the surgical exposure by pushing the nerves away producing forearm paraesthesias are additional complications. The most common reported complication associated with endoscopic ulnar nerve release is hematoma formation (4).

Conclusion: Endoscopic decompression of the ulnar nerve at the elbow is highly appreciated by patients with SNUS and provides excellent functional results. However, in patients with very mobile ulnar nerves at the elbow preoperatively, endoscopic decompression may result in postoperative luxation and required re-operation with ulnar nerve transposition. There are endoscopic assisted techniques (4) of ulnar nerve release and transposition using extra portals to allow retractors to be inserted, the medial intermuscular septum to be excised, cautery to be used, and a tape to control the position of the nerve.

Global Outcome after Carpal Tunnel Decompression: Comparison between Simple Carpal Tunnel Release and the Release with Epineurotomy. Clinical and Neurophysiological Study

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Background

Carpal tunnel syndrome is the most common cause of peripheral nerve entrapment neuropathy in the upper limb. If conservative treatment fails, surgery is required aiming at the release of the median nerve by opening the transverse carpal ligament. During the open release, several authors have advocated internal neurolysis as an adjunctive procedure. This retrospective study compares two groups of patients: the first group treated with the classical, open technique associated with an epineurolysis under loco-regional or general anesthesia and the second group treated with the simple decompression using a mid-palmar short incision under local anesthesia.

Patients and methods

Between January 2009 and December 2012, a total of 233 patients (277 hands) presenting a carpal tunnel syndrome based on clinical examination and neurophysiologic study underwent open release in our clinic. Exclusion criteria were: patients older than 80 at time of surgery, patients presenting other upper limb pathologies and repeated surgery. A total of 167 patients (131 females, 36 males) met these criteria, 16 (9.58%) of which had bilateral CTS. Out of 199 surgical procedures, 140 were classical open release with external neurolysis and 59 were mini-open. Every patient had an electrophysiological study at a minimum of 6 months after the surgery. The Levine-Katz Boston CTS questionnaire symptom severity score was used for hand function evaluation and pain evaluation at time of diagnosis, 1 month and 6 months postoperatively.

Results

The subjective outcome measured by the Boston questionnaire noted a significant (p<0.05) increase of global patient satisfaction at 1 month postoperatively in the mini-open group. Night pain relief and paresthesia relief were comparable in the two groups but weakness, wrist pain and discomfort at pressure seemed to be higher in the long incision group. This longer incision is associated with a longer rehabilitation period and a longer work inability. Both techniques had similar outcomes on the electrophysiological studies; there was no statistical difference (p<0.05) between groups when comparing the nerve conduction velocity and the motor response latency. Finally, the cost of these operations is very different in favor of the short scar procedure under local anesthesia.

Conclusion

The mini-open technique without external neurolysis under local anesthesia is our choice for the treatment of carpal tunnel syndrome. The epineuromytomy does not improve the outcome and it can be an unnecessary adjunctive procedure potentially harmful.
014 Open versus Endoscopic Carpal Tunnel Release: who benefits from what!

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Carpal tunnel syndrome is a common compression neuropathy of the median nerve that is often treated by release of the transverse carpal ligament. We present a literature review comparing efficacy and safety of open and endoscopic carpal tunnel release (CTR), and try to define clear indications based on patients’ characteristics. This is relevant, as carpal tunnel release is involved in 20% of the hand surgery medical claims.

Advantages of an open procedure include a better visualization and the possibility to perform additional interventions through the same incision. These interventions include the resection of cysts and inflammatory tissue associated with synovitis and tendinitis. Disadvantages comprise more postoperative pain, more loss of hand grip in the early postoperative period and a higher frequency of complex regional pain syndromes (CRPS).

During endoscopic CTR according to Agee the release of the transverse carpal ligament is performed under direct endoscopic vision through a small incision proximal of the wrist. That technique does not require any postoperative immobilization and is favourable in terms of scar formation in the palm, early return to work and immediate hand function. However, an endoscopic procedure is more expensive, it does not allow inspection of the nerve and it has a longer learning curve, especially in smaller wrists.

The ideal patient for endoscopic CTR is an economically active patient with a moderate carpal tunnel syndrome in a large wrist. An open CTR is recommended in a small wrist with an extensive carpal tunnel syndrome, especially after a trauma or in the presence of concomitant affections such as synovitis and cysts.

Last but not least, one should always keep in mind that for the patient, the result is more important than the technique. This should also be the case for the surgeon...
Neurodynamics Mobilization Techniques of the Upper Limb: from Theory to Clinical Applications

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Abstract

Mobilization and testing of the nervous system has recently emerged as an adjunct to assessment and management of pain syndromes.¹,²,³,⁴ An important aspect of this approach is that healthy mechanics of the nervous system enable pain-free posture and movement to be achieved. However, in the presence of patho-mechanics of neural tissues (e.g. nerve entrapment), symptoms may be provoked during daily activities.⁵ The authorship of these techniques must be assigned to Bragard in 1929. Later, Elvey in 1979 described the ‘Brachial Plexus Tension Test’ (BPTT) and suggested five tests and mobilizations for the median, the radial, the ulnar, the musculocutaneous and the axillary nerve. The term of ‘nerve provocation test’ was also used. In 1988 Kenneally modified the name of these tests and called them ‘Upper Limb Tension Tests’ (ULTT). Butler used that same appellation in 1991 and lately, in 1995 Shacklock called these tests the ‘Upper Limb Neurodynamic Tests’ (ULNT). This term is, following the author, more ‘encompassing’.

Neural Mobilizations (NM) are often used in clinical practice for patients with nerve root compromise. Although these techniques seem beneficial, their mechanisms of action remain unclear. After nerve root compression, an intraneural edema appears leading to the nerve structure damage and alteration in function.⁶,⁷ The absence of lymphatic vessels in the endoneurium limits drainage of this edema thereby creating a ‘mini-compartment syndrome’ within the neural tissue.⁷,⁸ This ‘mini-compartment syndrome’, due to the increase in endoneural pressure, subsequently leads to fibrosis and adhesions, impairing neural tissue gliding.⁹ The NM techniques are passive or active movements that focus on restoring the ability of the nervous system to tolerate the normal compressive, friction and tensile forces associated with daily activities.⁹ The hypothesized benefits from these techniques include reduction of pain, facilitation of nerve gliding, reduction of nerve adherence, dispersion of noxious fluids, increased neural vascularity and improvement of axoplasmic flow.¹⁰,¹¹,¹²,¹³,¹⁴ Some textbooks describe neural mobilizations techniques but highlight the lack in quantity and quality of the available research. Recently, Brown¹⁵ and Gilbert¹⁵ reported an increase of the intraneural fluid dispersion after both ankle and lower limb mobilizations, respectively. Moreover, most clinical trials have evaluated cervico-brachial nerves for both cervico-brachial pain and carpal tunnel syndromes. Qualitative analysis revealed a moderate evidence to support the use of lower limb neural mobilizations with an improvement of function, pain and strength.¹⁶,¹⁷,¹⁸,¹⁹,²⁰ In conclusion, even if the mechanisms of action of neural mobilizations remain unclear evidence is building in support that neural mobilizations is effective in addition with other conservative treatments.

References:
CECS is an exercise-induced increased pressure within a closed fibro-osseous space, causing reduced blood flow and tissue perfusion, leading to ischaemic pain condition and disability. The increased compartment pressure is transient and resolves with rest.

Etiology
It has been described in the flexor and extensor compartments of the forearm in association with weight training, kayaking, tennis, gymnastics, field hockey, climbing, water skiing, wheelchair athletics, carpentry and factory assembly work. It seems particularly prevalent in motorcycling, an activity requiring repetitive gripping (6).

Diagnosis
The symptoms including pain, a feeling of tightness and weakness are often bilateral and recur with activity. Differential diagnoses include tendinopathies and vascular or nerve entrapments.

Intramuscular pressure measurements are the mainstay of the diagnostic evaluation for CECS. A precise protocol (1) is necessary to avoid the variations in pressures and interpretation evident in the literature. In the forearm, for a group of volunteers without symptoms, there is no significant difference between pre- and post-exercise (within 2 minutes) pressures (with individual augmentation or diminution) (1). If the value of the upper confidence interval for the highest pressure in each compartment is taken, this can be used clinically to guide the decision to perform fasciotomy. For the extensor compartment of the forearm, this upper value is 25.2 mm Hg, and for the flexor compartment, it is 21.4 mm Hg (1). Delay in return of intracompartmental pressures to normal is thought by some authors to be important in the diagnosis of CECS. A review of the literature gives informations about the anterior compartment of the shank in healthy subjects, transposable with caution to the forearm. There, the mean upper confidence limits for pre-exercise, during, relaxation, and post-exercise 1- and 5-min intramuscular pressures are 14 mmHg, 54 mmHg, 18 mmHg, 36 mmHg, and 23 mmHg, respectively (4). These limits are in line with the values reported by symptomatic motocross racers (6).

Magnetic Resonance Imaging shows on T2-weighted images a muscle signal augmentation after exercise (5). In motocross racers symptomatic for CECS, the augmentation is inhomogenous, dominant in the symptomatic compartment of the forearm (2). It is a noninvasive initial screening process.

Near-infrared spectroscopy shows (in the leg) a decreased oxygenation in comparison to controls after exercise (5).

Treatment
A conservative biomechanical approach to reduce muscle load is first tried, including equipment (such as suspensions of the bike, handles,...) and technique (increased use of the legs,...). If it is not sufficient, the decision to perform a fasciotomy of the affected compartments may be taken on the basis of symptoms and the intramuscular pressure values. Open fasciotomy, partial fasciectomy or endoscopic fasciotomy are successful procedures in the long term (6, 3). Morbidity, especially for the scars (Figure 1) and the speed of recovery is lower for the endoscopic fasciotomy. For the endoscopic decompression of the anterior compartment, a line is drawn between the medial epicondyle and the palm (Figure 2). Two small incisions are performed at 5 cm each from the centre of the line. The prefascial space is opened and the aponeurosis (including the lacertus fibrosus) is cut under endoscopic control (Figure 3). The same is performed for the posterior compartment with a line drawn between the lateral epicondyle and the Lister’s tubercle (3).
Figure 1: Enlarged scars after a classic incision for fasciotomy (arrows) in a case of CECS in a motocross racer.

Figure 2: Scissors (asterisk) fasciotomy of the anterior compartment under endoscopic control.

Figure 3: The scissors (asterisk) cut the fascia (arrow head) covering the muscles and tendons (arrow).

References


See also:
SESSION 4: DUYPUTEN AND HAND TENDONS

017 Minimal Invasive Treatment of Dupuytren Disease
I. Degreel (Leuven, Belgium)

018 Non-Operative Treatment of Dupuytren’s Disease
N. Cyllits, J-P. Moermans (Brussels, Belgium)

019 Collagenase Outcomes in a Single Unit
F. Marlborough, W. Bhat, A. Al-Mousawi, J. Auyeung, P. Sugden, M. Erdmann
(North Durham, United Kingdom)

020 Trigger Fingers: What’s New?
K. Drossos (Brussels, Belgium)

021 Efficacy of Steroid Injections in Trigger Finger Injections
K. Sigamoney, C. Coapes (Middlesbrough, United Kingdom)
017 Minimal Invasive Treatment of Dupuytren Disease

I. Degreef

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To assess impact of surgical technique on self-reported recurrence, a single-centre survey and retrospective analysis of 216 patients with a minimum 2 year follow-up was conducted. Compared to all other techniques with a 58% recurrence rate (fasciectomy and dermofasciectomy), segmental fasciectomy had significantly lower recurrence of 43%. Patients with dermofasciectomy and skin grafting reported a surprisingly high recurrence rate of 63%. A significantly lower Abe score for Dupuytren’s diathesis was seen in segmental fasciectomy. Exclusion of high risk patients with Abe’s scores over 4, reduced the differences in reported recurrence. We conclude that segmental fasciectomy does not imply higher recurrence risks and on the other hand, total fasciectomy with skin resection means no guarantee for indefinite results. Surgical treatment in Dupuytren’s disease is confined to correcting contractures, without curing the patient. Therefore, whenever surgical correction is feasible with segmental fasciectomy, this minimally invasive technique should at all times be considered.

018 Non-Operative Treatment of Dupuytren’s Disease

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Dupuytren’s disease is a benign fibromatosis affecting the palmar and digital fascia and causing flexion contracture of the affected fingers. Up to date, this affection has no curative treatment available.

Open fasciectomy remains the “gold standard” surgical treatment of the disease but enzymatic treatment of the cords by injected collagenase clostridium histolyticum (CCH) represents a promising new therapeutic.

The presentation will discuss the results and complications of CCH injections of the senior author (J-P. M.) focusing on patient’s expectations in the treatment of their disease. An original comparison with the actual trend of patient’s expectations in cosmetic surgery will be presented.
019 Collagenase Outcomes in a Single Unit

F. Marlborough, W. Bhat, A. Al-Mousawi, J. Auyeung, P. Sugden, M. Erdmann

University Hospital of North Durham, United Kingdom

Introduction

Collagenase clostridium histolyticum (CCH) is a recently developed nonsurgical treatment for Dupuytren’s disease. The aims of this study were to evaluate outcomes of collagenase in a single hand unit.

Materials & Methods

Finger joint angulation was measured (with a goniometer) before, immediately after and at six week follow up post collagenase treatment in all patients managed in our unit. A standardized collagenase administration and splintage protocol was followed by all physicians.

A validated, Dupuytren’s specific patient reported outcome measure (Unite Rhumatologique des Affections de la Main, "URAM") was used to assess subjective hand function before and six weeks after collagenase. A maximum score 45 implies severely disabled hand function while a minimum score 0 implies completely unimpaired function.

Complications of treatment were recorded. To assess cold intolerance, a tenth question was added to the 9-question URAM questionnaire to obtain patients’ experience of cold intolerance following CCH treatment.

Results

76 patients were included. Average age was 66 (range 48-89). 17/76 (22%) were female, and 59/76 (78%) were male.

These 76 patients underwent a total of 101 injections with CCH. Of these, 66 occurred on the right hand, and 35 on the left. The commonest injection site was the little finger PIPJ.
Open or percutaneous A1 pulley release? (Fowler 2013)

As reported by Pruzansky in 2014, the majority of the respondents hand surgeons members of the American Association for hand surgery preferred corticosteroid injections for initial treatment of trigger finger. A large minority of surgeons utilized splinting in their conservative treatment.

Open trigger release has a high success rate with low morbidity and is considered the standard operative treatment (Ryzewicz, M. 2006, Tyrowski 1997, Lange-Riess 2009). Surgical release of the A1 pulley is recommended when conservative treatment (steroid injections, splinting) fails to relieve painful triggering of the flexor tendons. An open surgical technique is generally considered simple and reliable, although complications and patient dissatisfaction have been reported [Bonnici AV et al. (1988), Thorpe AP (1988), Will and Lubahn (2010)]. If equally effective, a percutaneous release would avoid the time and expense of an outpatient surgical procedure. In addition, one would expect a reduction in the incidence of both scar tenderness and infection, which are reported complications of the open technique.

Lorthioir J (1958), a Belgian surgeon, was the first to describe a technique of subcutaneous release of the A1 pulley using a fine tenotome passed through the skin. He reported good results with only a few patients complaining of discomfort for several days. However with this technique, there is the possibility of injury to the neurovascular pedicle and therefore this procedure was abandoned (Eastwood DM et al., 1992).

Proponents point to the ease of the procedure, decreased pain, faster recovery, absence of a painful palmar scar, and the flexibility to perform the procedure in the office with reduced costs (Eastwood 1992, Calleja 2010). Hypodermic needles are usually used for percutaneous release (Eastwood 1992, Maneerit 2003, Ragoowansi 2005, Zyluk 2011, Sato 2012) but the use of blades or specially designed scalpels has also been reported (Dierks 2008, Chao 2009).

Reported success rate is high (94% for Eastwood 1992 and Ha 2001). Recurrence rate is variable from 5% (Ragoowansi 2005) to 0% for Zulyk (2011). Calleja (2003) performed percutaneous release of 25 trigger fingers using a 19-gauge needle, then performed an open trigger release and found that only 6 of 25 (24%) achieved a complete A1 pulley release. Superficial tendon abrasions were noted in 15 fingers (60%).

Habbu (2012) used a no. 15 blade scalpel to perform percutaneous release in 54 fresh frozen cadaver fingers and noted complete release in 72% of fingers. Longitudinal scoring of the tendons occurred in 20%, but no neurovascular injuries were found. There was a 22% incidence of release of the proximal edge of A2 pulley.

Cebesoy (2006) described 25 trigger thumb releases in 21 patients using an 18-gauge needle, followed by corticosteroid injection. Four patients had an incomplete release and then underwent open pulley release. Three of the 4 patients had superficial tendon lacerations noted at the time of open surgery. Percutaneous release on thumbs is generally considered more dangerous because the radial digital nerve crosses at the level of the A1 pulley.

Jou and Chern (2006) used ultrasound-guided percutaneous trigger release on 104 digits in 80 patients. At final evaluation an average of 15 months later, 97% of patients experienced relief of pain and none had mechanical recurrence. Rajeswaran (2009) performed ultrasound-guided percutaneous release in 35 fingers, with complete resolution of symptoms in 91%. Pegoli (2008) compared open with endoscopic trigger in 200 patients and found equivalent results.

Guler (2013) in a retrospective study of 87 trigger thumbs treated with either open pulley (n=52) or percutaneous needle release (n=32) found a similar therapeutic efficacy. The rate of complications was statistically similar in both groups. However the 5.7% rate of iatrogenic digital nerve injury seen in
the percutaneous group is clinically significant. Therefore, they advocate using open surgical release for trigger thumb.

Dierks (2008) randomized 36 patients to either traditional open pulley release or percutaneous release with a no. 15 blade scalpel. The authors found greater range of motion at 1 week in the percutaneous group, but equivalent pain and grip strength at 1 week and 12 weeks and equivalent range of motion at 12 weeks. Mean surgical time in the percutaneous group was 26 seconds, compared with 10 minutes in the open group.

Gilberts (2001) have published a prospective and randomized study. They conclude that percutaneous correction of trigger digits using an 18-gauge needle is a quicker procedure, is less painful, offer an earlier return to work and shows significantly better results in rehabilitation than open surgery. There were no revision surgeries in the percutaneous group, but 1 revision surgery in the open group.

Sato (2012) randomized 150 trigger fingers to corticosteroid injection, percutaneous release, or open trigger release. The authors noted 100% relief of triggering in both the percutaneous and the open groups and reported no complications.

Wang (2013) performed a meta-analysis using these randomized trials. The authors found no differences in the failure rate or complication rate between open and percutaneous techniques.

However, there was significant heterogeneity between the studies.

As conclude by Fowler, the published series for percutaneous release are much smaller than those for open release, generally fewer than 100 patients. The published prospective randomized trials are too small to identify differences in infrequent adverse events such as incomplete release and nerve or tendon injury. The definition of an adverse event varies widely among studies. For instance, Will and Lubahn (2010) included postoperative pain and swelling as a complication and documented an adverse event rate of 30% of the patients in their series, whereas Turkowski (1997) defined an adverse event as neurapraxia, tendon bowstringing, or ulnar deviation of the finger, and reported an adverse event in 8%.

We believe that percutaneous release of the A1 pulley seems to be a promising technique. Knowledge of hand surface landmark ratios in order to locate the proximal A1 pulley edge is necessary, thus facilitating complete trigger finger release (Wilhelmi BJ et al. 2001). For the surgeon, unfamiliar with this technique, training in the cadaver laboratory is recommended (Bain GI et al. 1995). Percutaneous release could be indicated for trigger finger of the long digit, after failure of conservative treatment or if negative predictive factors are present (diabetes mellitus, more than 4 months clinical symptoms). The procedure is recommended for fingers with obvious triggering. This enables the surgeon to monitor the release during the procedure by asking the patient to actively attempt to produce the triggering. Adequate release is assured when there is no evidence of triggering with active flexion. Due to the neurovascular anatomy of the thumb, open release is still considered to be safer for A1 pulley release.

-Directions for future research:

Larger prospective randomized trials with more homogenous groups of patients would help determine whether there is a meaningful difference in relief of symptoms and adverse events between open and percutaneous release. With relief of symptoms from triggering exceeding 90% regardless of the technique, it would require 350 patients per group to detect a 5% difference assuming an alpha of 5% at 80% power. Randomized trials evaluating adjunctive techniques for percutaneous release techniques such as ultrasound guidance are needed to determine whether there is a benefit over blind release. Randomized trials comparing different percutaneous release devices (eg, hypodermic needle, knife blade) may help determine the advantages and disadvantages of specific devices. The significance of incomplete release and superficial flexor tendon injuries with percutaneous release requires further study and longer-term follow-up with respect to recurrence and range of motion. The value of various approaches should be investigated because percutaneous release done in the office seems much more economical (Fowler 2013).
Relationship between carpal tunnel surgery and trigger finger occurrence

The appearance of trigger finger after decompression of the carpal tunnel without a preexisting symptoms has been reported in the literature. The cause is not clear yet.
The results of Karalezli (2013)’s in vitro study support that transverse carpal ligament and forearm fascia release may be a predisposing factor for the development of trigger finger by the effect of changing the entrance angle to the A1 pulley and consequently increase the friction in this anatomic area.
Lee (2014) demonstrate with an ultrasonographic study of 92 patients underwent a carpal tunnel release had a volar migration of the flexor tendons. This migration was more important in patients who developed a trigger finger after CTR. This difference was statistically significant.

Site for steroid injection

In a randomized controlled trial an injection at the base of the proximal phalanx is significantly less painful than a conventional injection technique over the metacarpal neck. The recurrence rate is not significantly different (Pataradool 2011).

The value of high frequency ultrasonographic imaging in trigger finger

Trigger finger is recognized as thickening and constriction of the flexor tendon sheath at the base of the digit at the A1 pulley.
Ultrasonographic examination show pathological changes including irregular internal echotextures, fluid collection, and dominant A1 pulley with increased thickness (Chiang 2013).
The flexor tendons thickened significantly before patients experienced triggering except in the thumb. Thickening of the volar plate appears to have an important role in continuous triggering (Sato 2012).
The A1 pulley in cases with PIP joint contraction was significantly thicker than that of the non-contraction group in all digits (Sato 2014).
The use of ultra sound guided injection of corticosteroid may be associated with extra time and effort, with no superior clinical benefits compared to the blinded technique (Cecen 2014).
In a placebo-controlled prospective study the use of a concomitant vibratory stimulation (95-Hz) does not reduce pain experienced during corticosteroid injection for trigger finger (Park 2014).
The use of sonoelastrography, a new technique for quantitative assessment of the stiffness of soft tissue shows an increased stiffness and thickening of the A1 pulley are considered to be causes for snapping in trigger finger, and corticosteroid injection can alleviate snapping by changing these 2 features (Miyamoto 2011).

Varied anatomy of the thumb pulley system

The pulley system of the thumb is composed of 4 components, as opposed to the traditional view of only 3. Along to the A1 pulley, the additional variable annular pulley may contribute to stenosis in trigger thumb (Schubert 2012).

Cutaneous landmarks of the A1 pulley

In a vitro study Fiorini (2011) shows that the distance between the digital-palmar and proximal interphalangeal creases may be used as a cutaneous landmark on the palmar surface for the exact location of the proximal edge of the A1 pulley in the palm of the hand, thereby ensuring greater safety in surgical procedures such as percutaneous release of trigger finger.

Histological findings

The pathogenesis of trigger finger is ascribed to primary changes in the A1 pulley (Sampson 1991, Drossos 2009). Biopsies from tendons of trigger fingers suggests that the tendon is also affected, and that trigger finger is a form of tendinosis (Lundin 2012).
021  Efficacy of Steroid Injections in Trigger Finger Injections

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Introduction

Trigger finger is a common reason for referral to hand surgery outpatient clinics. The lifetime risk of developing trigger finger – 2 to 3%. Symptoms - Painful triggering or clicking during active motion of digit. The technique of steroid injection into the flexor sheath was introduced in 1953 by Howard. It has become an accepted initial treatment for the condition.

Methods

Retrospective study using clinic injection book and clinic letters.

Results

There were 36 patients (37 digits) from Jan 2011 to March 2013 with at least a 2 year follow-up. All were done with 40 mg premix lignocaine and steroid injections. 10 trigger thumbs and 27 trigger fingers (other). All Patients had at least 1 injection and the success rate of the 1st injection was 54.1% and 2nd injection 90.9%.

Conclusion

There was a high success rate with 1st injection, success rate increases with the 2nd injection. Only 18.9 % needed surgery, most after 1 injection – possibly could be reduced with 2nd injection. We found that it was more effective index and little fingers but the numbers are smaller. Most of our findings are inline with literature apart from the digit where the injection is most effective. We suggest give up to 2 injections prior to surgery.
SESSION 6: SHOULDER (1)

022 Coraco-Clavicular Fixation using the Tight-Rope® System after Lateral Third Clavicle Fractures or Acromio-Clavicular Joint Dislocations: Functional and Isokinetic Evaluation
N. Bloemers, K. Cermak, F. Schuind (Brussels, Belgium)

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Coraco-Clavicular Fixation using the Tight-Rope® System after Lateral Third Clavicle Fractures or Acromio-Clavicular Joint Dislocations: Functional and Isokinetic Evaluation

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Background

Several medical managements exist in case of lateral third clavicle fractures (LCF) and acromioclavicular joint dislocations (AJD), which represent prevalent shoulder girdle disorders.¹²

Methods

Our work includes 12 patients with a mean age of 40.9 years and studies the postoperative results of coraco-clavicular fixation (Tight-Rope®) after lateral third clavicle fractures or acromioclavicular joint dislocations. We have evaluated the functional results (visual analogue scale (VAS), active range of motion, Constant score (CS), Simple Shoulder Test (SST) and isokinetic peak torque (IPT)). We have also used radiological images centered on the acromioclavicular joint in order to measure the coraco-clavicular distance (CCD).

Results

Four LCF (all Neer IIb type) and 8 AJD (4 type IV and 4 type V) were evaluated. The average VAS was 0.72. The mean active range of motion was 171.7 degrees for the forward elevation and 170.0 degrees for the abduction. The Constant score on the operated side was 86.9 [±7.6]. The average of positive answer in the Simple Shoulder Test was 11.3 [±1.4]. The preoperative and postoperative CCD were, respectively, 21.04 [±5.9] mm and 14.28 [±4.9] mm. The IPT were similar statistically between operated and non-operated shoulders. Four patients felt a discomfort when pressure was enhanced on the clavicular button. Two patients presented a residual LCF (grade II) and a verticalization of the coracoïd button was observed.

Conclusions

The coraco-clavicular fixation, Tight-Rope® type, offers suitable functional and radiologic results. The advantages of this surgical technique are a discrete vertical scar, no-material removal and a low major complication rate. Although, a discomfort around the clavicular button region can appear.

References

Acromioclavicular joint pain is a frequent cause for visiting an orthopedic surgeon. Very common it is the consequence of a single traumatic event, ranging from a simple sprain to a radiological detectable AC dislocation, but repetitive micro-trauma related to work, sports and other strenuous activities can lead to joint degeneration, arthritis with spurs and osteolytic cavities in the distal clavicle.

Unstable AC joint should probably be stabilized early after injury. On the other hand painful AC joints presenting arthritis (primary, rheumatoid or even septic) are suitable for surgical treatment if a well conducted conservative treatment has failed. The classical Mumford procedure is proposed in this cases.

Only in the early 90ties a number of arthroscopists began to perform arthroscopic distal clavicular resections and different options were proposed: some were in favor of performing the procedure as an extension of an acromioplasty, others preferred an isolated AC approach, respecting the CAL if no signs of subacromial impingement were present.

Early studies reported failures caused by lack of adequate bone resection (especially posterior), perhaps due to the learning curve.

We will discuss the specific indications, advantages and disadvantages of each technique, the installation, the portals, the amount of resection on acromial and clavicular side, as well as managing of possible failures.
024 Arthroscopic Acromio-Clavicular Resection – How I do it

Fl. Mulpas
Brussels, Belgium

Abstract not received in due time.
025 Results of Arthroscopic Acromio-Clavicular Resection - Retrospective Study

E. Moest, O. Bath
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Abstract not received in due time.
Rotator cuff tears can lead to a variety of clinical manifestations, including debilitating shoulder dysfunction and impairment. The goal of rotator cuff repair is to eliminate pain and improve function with increased shoulder strength and range of motion. The surgical approach for rotator cuff repair has progressed from open (deltoid-pectoral, anterolateral with partial detachment deltoid) to mini-open (deltoid-split) to arthroscopic. However several variables need to be taken into account when deciding how to address the rotator cuff tear.

1. Deltoid muscle: postoperative deltoid dysfunction is a risk when performing open cuff repair with partial detachment and reattachment of the anterior deltoid. This can be avoided using a delto-pectoral approach, mini-open or arthroscopic approach.

2. Localization of the tear: Retracted postero-superior tears are more difficult to address using a delto-pectoral approach. Antero-superior tears are more difficult reached using a mini-open procedure. Arthroscopic subscapularis repair can be technical more demanding then arthroscopic supraspinatus repair.

3. Size of the tear: Partial intra-articular tears are better identified and visualized with arthroscopy. Small non-retracted tears can be reached with less deltoid manipulation in mini-open or arthroscopically. In massive cuff tears, release of the tendon can be necessary but can be addressed with the several approaches.

4. Concomitant intra-articular pathology: biceps pathology, common in rotator cuff pathology, can be easily addressed arthroscopically and can be more difficult in small cuff tears with open or mini-open technique. Also other pathology like cartilage lesion can be treated better arthroscopically.

5. Concomitant treatment: during non-reparable, the use of a scaffold and tendon transfer may be necessary. Currently these treatment options are performed most commonly open but arthroscopic techniques have been described.

6. Surgical training: younger surgeons are currently more arthroscopically trained but there remains a larger learning curve for arthroscopic repair in contrast to open repair.

7. Surgical technique: The most common technique in open and mini-open surgery is transosseus. Arthroscopically this was initially not possible and anchors were developed. With the use of anchors a single row, double row or transosseus equivalent can be performed arthroscopic but also open. Currently also new tools are developed to perform transosseus repair arthroscopically.

8. Cost: arthroscopic tools and anchors have been invited specifically for the arthroscopic rotator cuff repair. These anchors can also used in open of mini-open repair but the extra cost of shavers, tubing and ablation tools can only be seen in arthroscopic treatment.

Several studies have been evaluating the outcome of the several approaches. Duquin et. al. described that the surgical approach has no significant effect on re-tear rate. Morse et al and Shan et. al. reported no difference in functional outcome scores or complications between the arthroscopic and mini-open repair groups.

Conclusion: Several approaches can be used to address rotator cuff tears. Currently there is no evidence to support the one above the other and the surgeon needs to address the pathology knowing the advantage and the disadvantage of the several techniques.
SESSION 7: SHOULDER (2)

027  “À la carte” Treatment of Anterior Shoulder Instability: an Evolution of Treatment of Anterior Shoulder Instability over a 17 year Period in a Specialized University Orthopeadic Department
Ch. Duysens, P. Boileau (Libramont, Belgium and Nice, France)

028  Open versus Arthroscopic “Bankart” Repair for Shoulder Instability
N. Pouliart (Brussels, Belgium)

029  Bone Block Procedures for Shoulder Instability: a Biomechanical Perspective
L. Willemont, O. Verborgt (Ghent, Antwerp, Belgium)

030  Effect of Different Techniques of Non-Anatomical Repair of Anterior Shoulder Instability (Latarjet Procedure) on Patient’s Response to Rehabilitation
H. Ali, K. Ayad, A. Rehan, W. Awadallah (Cairo, Egypt)

031  Locked Posterior Shoulder Fracture Dislocation – a Review of 12 Cases
K. Sigamoney, D. Burton (Darlington, United Kingdom)

032  Percutaneous Treatment of Humeral Head Osteonecroses by Stem Cells Injection
Ph. Hernigou, I. Guissou, J. Delambre, A. Poignard (Paris, France)

033  Percutaneous Humeral Derotational Osteotomy in Obstetrical Brachial Plexus Lesions - Technique and Functional Results
A. Aly, P. Salvia, V. Feipel, J. Bahm, F. Schuind (Brussels, Belgium)

034  To Evaluate the Accurate Location of Bone-Block and Screws with Arthroscopic Latarjet Procedure
O. Flamand, J. Kany, R. Guinand, P. Croutzet (Mons, Belgium, Toulouse, France)

035  3D Upper Limb Motion Analysis in Obstetrical Brachial Plexus Lesions
P. Salvia, A. Aly, V. Feipel, F. Schuind, J. Bahm, S. Van Sint Jan (Brussels, Belgium)
Introduction

The development of Arthroscopic Bankart Repair (ABR) 20 years ago led the surgeon to propose this procedure extensively and then, to face an increasing rate of recurrence with time. The most challenging for the surgeon is to choose the correct treatment, adapted to the lesions encountered in each individual shoulder. Today, we all know the diversity of the lesions we face treating shoulder instability. In soft tissue, we have to recognize of course the nearly systematic Bankart lesion, the distension of the IGHL (always impaired in hyper laxity) and the HAGL lesion. All these lesions were well summarized by Boileau and his “Hammock Aphorism”. We need also to check the bone stock of the glenoïd (we have to recognize and to quantify any fracture or bone loss) and the humerus (we need to evaluate the size and the orientation of the Hills-Sachs lesion).

From this point, as we know the diversity in extension and in gravity of the lesions encountered when dealing with shoulder instability, is-it logical to propose the same procedure (i.e. Arthroscopic Bankart Repair or Hill-Sachs Remplissage or Latarjet) to everybody?

Selection is the key to preventing recurrence following anterior instability surgery.

The analysis of treatment failures following arthroscopic Bankart repair, glenoid and humeral bone loss as well as anterior and inferior hyperlaxity (constitutional or acquired) were found to significantly predispose towards recurrent instability. Patient age (<20 years), type of sport (contact or forced overhead sports) and level of practice (competition) are additional factors that have been implicated in the aetiology of recurrent instability.

Using clinical history, examination and plain radiographs alone, the Instability Severity Index Score (ISIS) can be calculated and used to assist in the determination of the appropriate surgical procedure that will result in the lowest probability of recurrence following surgery for antero-inferior instability. It’s an easy tool that can help to guide the daily clinic practice to the good therapeutic choice and the first
028 Open versus Arthroscopic “Bankart” Repair for Shoulder Instability

N. Pouliart

*Universitair Ziekenhuis Brussel, Brussels*

There is a consensus that shoulder instability with large bony defects, be it on the glenoid or on the humeral side, should not be treated by a « Bankart » repair. The latter technique should be reserved for labroligamentous lesions and small bony deficiencies. But should this then be done open or arthroscopically?

The history of soft tissue repairs has evolved from pure open capsular shifts to simple labral refixation to the current state of a combined approach. Arguably, this can be done in a more reliable way through an open approach. Early comparative studies from the eighties and nineties seem to support this conclusion. Results from the last ten to fifteen years offer a different perspective, however. Now, arthroscopy attains similar if not better rates of success than open surgery. Several factors have influenced this evolution:

- better understanding of the pathology involved, with closer attention to ligamentous lesions as opposed to simple labral tears and to lesions of other quadrants as opposed to only the anteroinferior
- addressing all structures involved which implies that surgeons to not only fix the labrum back to the glenoid in the position where it is found, but perform a capsular shift, add “rotator interval closure” or repair concomitant posterior and superior extension
- technological evolution from the early transglenoid sutures over tags to the current anchors
- and last but not least overcoming the learning curve of the arthroscopic experience.
Bone Block Procedures for Shoulder Instability: a Biomechanical Perspective

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The primary objective of surgical shoulder stabilization is the prevention of recurrent instability. Patient characteristics (such as age, physical activity and joint hyperlaxity) and patho-anatomic lesions (Hill-Sachs lesion and/or glenoid bone loss) determine the patient's risk of recurrence.¹ The Bristow-Latarjet procedure,⁶,⁷ is recommended for the treatment of high-risk patients who typically present with anterior glenoid bone loss, or are involved in competitive contact sports.³,¹⁸ Thanks to the combined effect of bony concavity restoration, dynamic sling effect and capsule reconstruction¹⁵, the Bristow-Latarjet procedure yields significant reductions in recurrence rates compared to standard labral repair.²,¹⁰ Nevertheless, reports of high complication rates has pushed recent research towards less complex or invasive alternatives.⁴,⁵,¹⁴,¹⁹ Open or arthroscopic glenoid augmentation using a free bone graft is a feasible approach, typically in cases presenting with significant glenoid bone loss.⁸,⁹,¹¹,¹₂,¹₃,¹₄ The advantages of an arthroscopic procedure include a careful exploration of intra-articular pathology, precise positioning of the graft and possibly non-violation of the subscapularis muscle.¹⁴ In a recent biomechanical study,¹⁶ the positive stabilizing effect of free iliac crest graft augmentation of the intact glenoid was confirmed, with a significantly higher peak force (PF) and energy to dislocate (ETD) in the bone grafted conditions compared to standard labral repair. Additionally, the vertical position of the graft was shown to have an important effect on stability. Bone grafts centered on the equator displayed a significantly greater PF and ETD than grafts positioned 100% below the equator when translating in the anterior direction. Translations in the antero-inferior direction, however, revealed a trend of higher PF and a significantly higher ETD for grafts 100% below the equator compared to grafts in the 50% position. These findings correspond to the intuitive notion that the bone graft will be most effective when positioned in the line of humeral translation. Increasing the glenoid width and thereby the glenoid track may also prevent Hill-Sachs lesions from engaging and thus reduce recurrence.

In this presentation, a comprehensive review of current biomechanical data on contributing factors of coracoid transfers and iliac crest graft procedures will be given.

References

030 Effect of Different Techniques of Non-Anatomical Repair of Anterior Shoulder Instability (Latarjet Procedure) on Patient’s Response to Rehabilitation

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1Cairo University Hospitals, Cairo University, Cairo, Egypt, 2Faculty of Physical Therapy, Cairo University, Giza, Egypt, 3Faculty of Medicine, Cairo University, Cairo, Egypt

Purpose: The purpose of this study was to investigate effects of labrum preservation or removal on shoulder pain, mobility, strength and proprioception in patients with anterior shoulder instability repair.

Backgrounds/Significance: Anterior shoulder instability is a common traumatic injury that may be complicated with recurrent episodes of symptomatic instability. When instability is associated with soft tissue or bony defects, open repair is the preferred surgical intervention. Latarjet procedure is one of non-anatomical techniques used for such cases in which coracoid and its conjoined tendon is transferred to anterior glenoid. This compensates for the capsulolabral and osseous injury by an osseous or soft-tissue checkrein that blocks excessive translation and restores stability. This procedure could be done while preserving or removing the glenoid labrum, depending on its integrity. Glenoid labrum increases glenohumeral joint congruency, stability and proprioception. Thus, its removal may affect joint integrity and hence patients’ functional outcome. This in turn may influence the selection of rehabilitation protocols of those patients. To the authors’ knowledge, there is no published evidence on changes in functional outcome in response to labrum removal or preservation.

Subjects: Twenty eight patients with age ranged between 22 and 52 years old were enrolled in this study. All patients have undergone Latarjet procedure for correction of recurrent shoulder instability and were referred for rehabilitation 2 weeks post-operatively. Patients were excluded if they showed any postoperative signs of recurrent instability, had any systematic or neurological disease that could interfere with shoulder function, or received previous corticosteroid injections into the operated shoulder. Based on the surgical technique, patients were divided into labrum preserved group (n=14), and labrum removed group (n=14).

Methods and Materials: After initial baseline assessment and examination, all patients received a standardized physical therapy rehabilitation protocol that was designed by Brigham and Women’s Hospital, U.S.A.1 Briefly, this program consists of range of motion, open and closed kinetic chain exercises. Patients were treated during the immediate post-surgical phase that focuses on pain relief and enhancing the healing process; and the intermediate phase that primarily targets the restoration of shoulder motions; and the muscle strengthening phase.

Pain severity, shoulder range of motion and muscle strength was quantified using the shoulder pain score, a digital inclinometer and a hand-held muscle tester, respectively. Proprioception acuity was measured using the closed kinetic chain upper extremity stability test (CKCUET). All measurements were done at 2nd (during phase I) and 16th weeks (at the end of Phase III).

Analyses: Repeated measures ANOVA using SPSS version 21.0. Significance level was set at p<0.05 throughout all analyses. Data are presented as means and SD.

Results: Within group comparisons showed significant improvement in all measured variables between the 2nd and 16th weeks in patients of two groups (p<0.01). Between groups comparison showed significant improvement in patients with labrum preservation regarding proprioception acuity (p<0.011, figure 01). Patient with labrum removal showed significantly greater improvement in pain severity (p<0.001, figure 02) and external rotation range of motion (p<0.001, figure 03).

Conclusion: Labrum preservation improves shoulder proprioception. On the other hand, labrum removal, when indicated, significantly improves pain and external rotation range following latarjet operation. Biomechanical and neurophysiological analysis as well as long term follow up is recommended to explain reported results.

References
1. The Brigham and Women's Hospital Inc.: Anterior Stabilization of the Shoulder: Latarjet Protocol., UK.
### Pairwise Comparisons

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* The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.
### Univariate Tests

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Each F tests the simple effects of Group within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Computed using alpha = .05
**Fig. (01) Closed Kinetic Chain Upper Extremity Test**

- *: Indicate within group significance
- **: Indicate between group significance

**Fig. (02) Pain**

- *: Indicate within group significance
- **: Indicate between group significance

**Fig. (03) Range of Motion**

- *: Indicate within group significance
- **: Indicate between group significance
Locked Posterior Shoulder Fracture Dislocation – a Review of 12 Cases

K. Sigamoney, D. Burton
Darlington Memorial Hospital, Darlington, United Kingdom

Introduction
Posterior fracture dislocation of the glenohumeral joint is an uncommon injury. It is quoted as accounting for less than 2% of all shoulder dislocations. There is a very high incidence of misdiagnosis (50 – 79%) most commonly due to atypical presentation in comparison to anterior shoulder dislocation, lack of clinical assessment, inadequate radiological exposure and lack of experience of the clinician involved in reading the radiographs. We aim to look at our patients and the impact the condition and treatment has on their lives.

Methods
All the patients under the consultant’s care who have had an acute locked posterior fracture dislocation of the shoulder. Their notes were reviewed retrospectively looking at demographics and details of the injury. With regards to the surgery, we looked at the type of surgery and implants used, any complications, further procedures, follow – up and the time it took to go back to work. Questionnaires which were the Oxford Shoulder Score were sent out and traced all patients.

Results
12 patients had injuries followed by surgery from May 2008 to July 2013. There were 9 males and 3 females. They were aged 30 – 79. 9 had the injury on the dominant side. All the patients medical records were available. 1 patient died from other cause. 1 patient could not be contacted. Therefore only 10 questionnaires were returned. Only 1 patient had previous disease to his shoulder, bilateral frozen shoulders.

For 6 patients, the injury was caused by a seizure. For the other 6 patients, it was caused by trauma. 50% (6 patients) had a misdiagnosis or were not diagnosed when seen in the Emergency Department.

All patients had a CT scan prior to surgery. Surgery was done within an average of 16 days (this included one patient who had surgery 78 days after injury due to misdiagnosis and delay in referral).

There were 3 broad groups of procedures done; hemiarthroplasty (3 patients), open reduction and internal fixation (5 patients) and The McLaughlin Technique (4 patients). For those who worked (5); the average time back to work 4.3 months. 4.5 months in ORIF, 4 months for hemiarthroplasty.

In terms of ROM:
• Hemiarthroplasty: (Mean) forward flexion of 102 degrees, external rotation of 47 degrees and abduction of 77 degrees.
• Near full ROM (170 deg abd, ff) with McLaughlin
• ORIF: (Mean) forward flexion of 163 degrees, 56 degrees of external rotation and 163 degrees of abduction.

For the OSS scores, the average OSS was 32.8. For those who had the McLaughlin procedure, the score was 31, ORIF, 42.8 (pain) and hemiarthroplasty it was, 25.5.

Conclusion
There was a high rate of misdiagnosis, 50%, of posterior fracture dislocation. The injury significantly impacts on patients lives. There was an average of 4 months off from work. Open reduction and internal fixation showed a better Oxford Shoulder Results Score. Clinically the McLaughlin gave better range of movement. The Limitation here however, is that there is an unequal amount of patients, small amount of patients and procedures varied according to the fracture pattern.
This study evaluated 125 shoulder osteonecroses treated with core decompression and autologous percutaneous bone marrow grafting.

126 shoulder osteonecroses were treated at our institution between 1990 and 2000, for atraumatic osteonecrosis of the humeral head. There were 34 women and 32 men, and their mean age was forty-two years (range, twenty-one to fifty-two years) at the time of the diagnosis. Sixty patients had bilateral involvement. Patients had a disease that affects the immune system, including systemic lupus erythematosus, scleroderma, or a disease treated with corticosteroids. The other patients had sickle cell disease. The mean duration of symptoms before the patients were seen was 5.4 months (range, two months to two years). According to the system of Ficat and Arlet, the shoulders had stage-I or II disease at presentation. Magnetic resonance images were available for all shoulders. The bone marrow was harvested under general anaesthesia from the anterior iliac crests. The aspirated marrow concentrated on a cell separator before percutaneous injection in the femoral head after core decompression with a small trocar. Patients were followed up from seven to seventeen years. The outcome was determined by the changes in the Constant score; by progression in radiographic stages; by the need of shoulder replacement, and by the volumetric evaluation of the repair tissue in the osteonecrotic humeral head on MRI. The number of progenitor that was transplanted was estimated by counting the Fibroblast Colony Forming Units which express type I and type III collagen.

An average of 152 ± 16 milliliters of marrow was aspirated from each iliac crest. The mean number of CFU-F per one million nucleated cells for the individual patients ranged 31 to 53 with a mean value of 40 ± 6. The bone marrow graft obtained after concentration (x 5) contained therefore on average 4889 ± 216 progenitors per cubic centimeter (range 3515 to 6293 per cubic centimeter). Each ankle received a mean number of 20 cubic centimeters of bone marrow graft (range 27 to 35 cubic centimeters). The average total number of CFU-F injected in each ankle was therefore 147 x 10^3 cells (range 119 x 10^3 to 195 x 10^3 cells). The technique of injection was performed under fluoroscopy with a percutaneous injection in the osteonecrosis through a lateral trans deltoid-approach.

Of these shoulders without collapse at their initial evaluation, nineteen demonstrated collapse within five years after autologous bone marrow grafting. No other shoulder demonstrated collapses after five years until the most recent follow-up (mean eight years; range 7 to 14 years).

For the shoulders without collapse, the ratio of the volume of the necrotic lesion before treatment to the volume of the whole humeral head was average 28.4 per cent. The mean volume of repair evaluated by MRI at the most recent follow-up was corresponded to a decrease of the percentage volume osteonecrosis of the femoral head from 28.4 to 3.8 per cent (range 0 to 100 per cent). For these shoulders without collapse and without revision at the most recent follow-up, the bone marrow graft contained 7526 ± 1312 progenitors per cubic centimeter and the total number of progenitors injected was 236 x 10^3 cells.

For the shoulders with collapse, the bone marrow graft contained 2341 ± 912 progenitors per cubic centimeter and the total number of progenitors injected in the femoral head was 81 x 10^3 cells.
Thirty three percent of children with obstetrical brachial plexus palsy (OBPP) with incomplete neurological recovery develop shoulder internal contracture associated with osseous deformity. Some of the older children are treated by humeral derotational osteotomy. The classical technique of open approach to the humeral diaphysis and plate fixation imposes a longitudinal scar and carries significant risks (nonunion, nerve palsy); a secondary procedure for plate removal is necessary in a significant proportion of patients. The authors report a new technique of percutaneous humeral osteotomy with osteosynthesis by Hoffman external fixator. Bone healing was obtained at an average of 45 days, without adverse complication. The postoperative results showed improved shoulder function. The new technique is simple and safe; it reduces the complications of open osteotomy techniques.
034 To Evaluate the Accurate Location of Bone-Block and Screws with Arthroscopic Latarjet Procedure

O. Flamand¹, J. Kany², R. Guinand², P. Croutzet²
¹Clinique Saint Joseph (Mons Hainaut), Mons, Belgium; ²Clinique de l’Union, Saint Jean, Toulouse, France

Objective: To evaluate the accurate location of bone-block and screws with arthroscopic Latarjet procedure.

Methods: 103 shoulders (102 patients) underwent arthroscopic Latarjet procedure in our institution, by single surgeon (JK). Following surgery immediately after the operation and after 3 months, the patients were submitted to a CT-scan examination and evaluated by an independent examiner. 32 parameters were evaluated, including vertical and horizontal coracoid graft positioning, screw angulation with the glenoid vault, bone-block fusion and neurological damage.

Results: 73 procedures (70.8%) were considered to be satisfactory (accurate bone block positioning, partial or complete fusion and no complication). The coracoid graft was properly positioned relative to equator of the glenoid vault in 92 cases (89.2%). It was properly positioned (ie flushed) in the frontal views for 76 patients (73.7%) and in the axial view for 78 patients (75.8%). The mean screw angulation with the glenoid vault was 20.7° (+/-11.9 Extreme 0° - 46.4°). There was no injury to the axillary or musculocutaneous nerves or suprascapular nerve. The main complications were: non-union for 18 patients (17.8%) articular lateral deviation of the graft (overlap of more than 1 mm for 25 (24.2%) patients) too long screws with posterior impingement for 4 patients (3.8%)

Conclusion: The arthroscopic Latarjet procedure is a complex technique in which each step must be precise to reduce the risk of complications. Our study showed that positioning the bone-block so that it lies onto the anterior aspect of the glenoid is safe without any major complication and with high frequency of accurate bone block and screws location.
035  3D Upper Limb Motion Analysis in Obstetrical Brachial Plexus Lesions

P. Salvia, A. Aly, V. Feipel, F. Schuind, J. Bahm, S. Van Sint Jan
Brussels, Belgium

Abstract not received in due time.
SESSION 8: ELBOW

036  Arthroscopic Treatment of Mason II Fractures of the Radial Head
F. Michels, N. Pouliart, F. Handelberg (Brussels, Kortrijk, Belgium)

037  New Anatomical Knowledge of Upper Extremity Fascia and Aponeuroses
O. Snoeck, S. Van Sint Jan, B. Beyer, P. Salvia, J. Coupi, V. Feipel, M. Rooze (Brussels, Belgium)

038  Endoscopic Treatment of Distal Biceps Rupture
O. Dhollander, E. Van Hoecke, R. van Riet (Deurne, Brussels, Belgium)

039  Ulnohumeral Elbow Arthroplasty: Arthroscopy versus Mini-Open
I. Degre (Leuven, Belgium)

040  Arthroscopic versus Open Elbow Arthrolysis
I. Degre (Leuven, Belgium)

041  Lateral Collateral Ligament Repair, Arthroscopic and Open Techniques
R. van Riet (Deurne, Brussels, Belgium)
036 Arthroscopic Treatment of Mason II Fractures of the Radial Head

F. Michels¹, N. Pouliart², F. Handelberg³
¹AZ Groeninge, Kortrijk; ²Universitair Ziekenhuis Brussel, Brussels; ³CHU St-Pierre, Brussels, Belgium

Background:
Treatment of Mason type II fractures of the radial head is still controversial. The purpose of this retrospective study is to analyse the functional results following arthroscopic reduction and percutaneous fixation of these fractures, as there are no published reports concerning this method.

Methods:
Fifteen patients with a Mason type II radial head fracture were managed arthroscopically for reduction and percutaneous fixation. Twelve patients (mean age 37 years, range 19 to 57 years) were available for follow-up and a final assessment was performed at an average of 4 years 11 months (range from 6 months to 11 years 1 month after surgery). Patients were evaluated for pain, motion and radiographic findings. The overall outcome was rated with the functional rating score described by Broberg and Morrey (B&M) and with the American Shoulder and Elbow Surgeons Elbow Assessment Form.

Elbow arthroscopy was performed using a standardised technique. The patient was placed in a prone position under general anaesthesia. The arthroscope was placed in the midlateral portal, the working portal was anterolateral. The reduction of the fracture was maintained with a K-wire. A screw with a differential thread was then inserted through a small stab incision. In case of a larger fragment, a second screw was placed using the same technique.

Results:
The average elbow (B&M) score was 97.2 points (range 86-100), corresponding with 3 good and 9 excellent results. Two patients with only good results had associated cartilage lesions of the capitellum. The result was unsatisfactory for none of the twelve patients. Average flexion was 142.6° (range 122 to 150), and the mean flexion deformity was 2.3° (range 0 to 14). There was no loss in grip strength. Radiographic evaluation confirmed good reduction and fracture healing.

Discussion and conclusion:
Our results show that arthroscopically assisted reduction and internal fixation of type II radial head fractures is a valid option with consistently good outcome. Although the technique is technically demanding, it allows more precise articular fracture reduction control, as well as better evaluation of associated lesions.
Fascia is a vague term representing a type of connective tissue connecting all structures to each other. Wrapping the specialized organs such as muscles, tendons or nerves, they are generally considered as structures without important function.

However, the latest researches showed that fasciae allow the muscle force transmission (Huijing, 2009), and therefore their negligence in surgery could be deleterious.

This presentation will focus on the anatomy and clinic implications of upper limb fasciae such as the areolar connective tissue (de Bruin et al., 2011; Kreulen et al., 2003), the deep fascia, the epimysium, the perimysium, the endomysium (Turrina et al., 2013) and the aponeurotic expansions. A special attention will be given to the lacertus fibrosus and its biomechanical roles (Snoeck et al., 2014).

References


Introduction
The diagnosis of a complete biceps tendon rupture is a clinical one and early surgical reinsertion and fixation is usually recommended.2,4 Diagnosing a partial tear is more problematic. Patients experience pain in the antebrachial region with resisted supination. Palpation of the tendon and its insertion are painful. It is not possible to clinically differentiate between a partial tear and tendinosis, nor is it possible to evaluate the extent of the tear. Ultrasound or MRI imaging, more specifically the Flexion Abduction, Supination (FABS) view1, offer additional information but it may still be difficult to quantify the extent of the tear.

Conservative treatment is generally recommended for a period of at least six months2,4. Surgery may be indicated if symptoms persist after this period. Classically, surgery consists of an anterior incision and the tendon is followed to its insertion. The extent of the tear is then evaluated and a decision is made to complete the rupture and reinsert or to partially debride the tendon, with or without reinforcement of the insertion2,4. As most partial tears occur at the interface between the radial tuberosity and the tendon, it is impossible to visualize the tear, without retracting and potentially further damaging the diseased tendon. Biceps tendonoscopy has been described as an option to protect the tendon while increasing the view of the insertion. This paper will describe the technique to safely evaluate and treat the tendon, using an endoscopically assisted method.

Technique
The patient is placed in supine position with the arm on an armtable. A tourniquet is used. A 2 cm incision is made centrally on the forearm, 3 cm distal from the flexion crease. The skin is incised only, in order to protect the lateral antebrachial cutaneous nerve. The forearm fascia is pierced medial to the nerve. In cases of a full rupture, the canal of the former biceps tendon is readily visible. The tuberosity and the retracted stump are visualized endoscopically. Retractors are used to protect the radial artery and nerve, as well as the median nerve. In patients with a partial rupture or tendinosis, the superficial part of the tendon can be reached with minimal blunt dissection. The tendon is then followed distally up to the bicipital tuberosity. The scope is placed between the tendon and the tuberosity. The insertion of the tendon is then evaluated.

If there is a tear of the tendon, this can now be seen. If necessary a shaver can be introduced into the bursa and fraying of the tendon can be debrided. It is extremely important not to shave any tissue without having a clear view of the shaver tip, in order to avoid damaging neurovascular structures in close proximity to the insertion. It is imperative to use retractors to protect the anterior soft tissues. Once the tear is debrided, the extent of the tear can be evaluated. The tear is then treated endoscopically or with a mini open technique, depending on the tear but also on the surgeon’s skill and preference.

Pearls / pitfalls

Pearls
• In cases of a partial distal biceps tendon tear, the tendon can be palpated and used as a landmark for the correct position of the incision.
• Insertion of the trocar can be difficult due to scarring in the bursa from chronic inflammation. Insufflation of the bursa with saline may facilitate entering the trocar into the bursa.
• If the initial view is unclear, the tuberosity can be palpat ed with the tip of the scope.
• Rotating the forearm while the tuberosity and tendon are into view will help in defining the anatomy.
• Insertion of the shaver can be done by sliding the shaver on the cannula of the scope until the shaver comes into view.
• When shaving, the use of retractors is highly recommended to protect the anterior soft tissues.

Pitfalls
• Anterior neurovascular structures are at risk. The shaver should not be used unless it is in perfect view and in the correct position.
• The procedure is time sensitive as irrigation fluid will lead to swelling of the bursa and impair the view.

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• Excessive swelling of the forearm should be avoided and if necessary the endoscopy has to be stopped to avoid the risk of a forearm compartment syndrome.

Results / Discussion
This technique was first described in 2006\(^1\). We have now performed this technique in nearly 50 patients with a partial distal biceps tendon tear. There have been no complications related to the arthroscopic technique. The estimated added tourniquet time is less than 10 minutes. The main advantage of this technique is the improved and magnified view of the insertion without the need to manipulate the diseased tendon. The insertion can easily be evaluated in different rotational positions of the forearm. Treatment is immediately tailored to the extent of the tear. Debridement and reinsertion can be performed using the described technique. Conversion to an open technique is simple and open reinsertion can be done using the same incision.

References
In cubanthritis-osteoarthritis of the elbow-surgical procedures may be considered to debride the elbow joint to reduce pain, to increase mobility, and to postpone joint replacement surgery. The ulnohumeral arthroplasty as described by Outerbridge and Kashiwagi was originally introduced to debride both anterior and posterior elbow compartments through a direct posterior mini-open approach. To achieve this, a distal humeral fenestration throughout the humeral fossa is performed. Although with an elbow arthroscopy, a technique that was obviously developed later on, all compartments can be easily visualized. The arthroscopic fenestration of the humerus preserves its advantages, with good clinical results focused on pain relief and gaining mobility. On top, future elbow joint locking based on degenerative loose bodies can be prevented. Therefore, this surgery is often done in young, more active patients and even in sportsmen. These patients, however, need to be prompted to restrict loading on the elbow in the immediate postoperative period, because the elbow is biomechanically weakened and may be prone to a fracture. However, both outcome and postoperative rehabilitation are promising and the arthroscopic Outerbridge procedure is a reliable procedure with an easy rehabilitation. Therefore, the threshold is relatively low in early cubanthritis and recurrent locking of the elbow. In this paper, we present a literature review and the author's experience and own research on the Outerbridge procedure.

Arthroscopic versus Open Elbow Arthrolysis

I. Degreef

Department of Orthopaedics, Hand Unit, University Hospitals Leuven, Belgium

The elbow joint needs to be both mobile and stable to exercise its hinge function, which is the key to a normal upper limb. Loss of motion in the elbow joint leads to an exponential functional handicap. Elbow trauma is a common cause of elbow stiffness. Open elbow arthrolysis with release of the capsule has been demonstrated to be a very useful treatment. Arthroscopic elbow arthrolysis has now gained popularity, along with the rapid evolution in elbow arthroscopy. The authors present the preliminary results of this technique in 12 patients, with a mean follow-up of 19.4 months. The range of motion significantly increased from an extension lag of 39.2 degrees and a flexion limited to 115 degrees to an extension lag of 17.9 degrees and a flexion of 131.7 degrees. On average, a 38 degrees gain in range of motion was achieved. This result is comparable with a gain of 40 degrees after open arthrolysis, reported by the senior author in a previous study. The DASH score improved from 39 to 28, but not significantly, and the VAS for pain from 5.5 to 3.4 (significantly). All patients would undergo the procedure again and they experienced a mean subjective improvement of 63.6%. A literature review showed that open and arthroscopic arthrolysis yield a gain of about 44.10 degrees and 31.25 degrees, respectively. The conclusion is that there certainly is a place for arthroscopic elbow arthrolysis.

The gold standard for the treatment of chronic PLRI, is an open reconstruction of the ligament using a tendon graft. However, in some cases the morbidity related to a large open exposure, and associated prolonged rehabilitation time may not warrant open surgery. In this presentation we demonstrate a novel all-arthroscopic technique to tighten the Lateral Ulnar Collateral Ligament (LUCL).

First a standard arthroscopy is performed. Then, the arthroscope is positioned into the radiohumeral gutter. The radial gutter is debrided before the Lateral Collateral Ligament (LCL) tightening is initiated.

Next, a needle is passed from the origin of the LCL complex, and advanced into the joint. A PDS suture is advanced through the needle and collected through the soft spot portal. A second needle is passed through the insertion of the LUCL complex, posterior to the radial head and from the subcutaneous border of the ulna. A second PDS suture is also advanced through the second needle, and the 2 PDS sutures are connected. The suture is advanced in such a way that no knots remain in the joint. This suture will be used as a lead suture.

Finally, a third, doubled suture is attached to the lead suture and looped through the origin and insertion sites. The suture ends are collected subcutaneously, and the ends are tied together.

The arthroscopic lateral collateral ligament plication is a safe technique, with an excellent postoperative stability.

The goal of this paper is to clearly instruct the surgical technique for the Arthroscopic LCL imbrication and to show the results of this procedure.
SESSION 9: WRIST (1)

042 Arthroscopy of the Wrist: the Pellenberg Experience of 25 Years
L. De Smet, I. Degreaf, M. Vannuffel (Leuven, Belgium)

043 Arthroscopic Reconstruction of the S-L ligament in the III-IV Lesions of
Geissler’s Classification: a New Way
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Arthroscopy of the Wrist: the Pellenberg Experience of 25 Years

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Abstract

Arthroscopy of the wrist has been a controversial procedure until international reports highlighted the value of this technique and considered it as the gold standard in wrist surgery. We have been involved in the application of wrist arthroscopy for different situations since the nineties. In the beginning the diagnostic value has been proven, although the more powerful imaging techniques have been taken over. Despite this we could demonstrate that in routine MRI about 25% of TFCC lesions were missed. There has been a significant growth of this procedure during the last decennia. Since 1999 we performed 1127 wrist arthroscopies (75 / year)

The treatment of TFCC lesions has been our major indication. A suture technique was developed in 1993 and continuous follow-up surveys have shown the reliable outcome of the technique. In a recent (2011) evaluation of 81 cases we found 82% good and excellent outcome with a mean DASH of 19.

Debridement of the (degenerative) of the TFCC in 45 cases was less favorable with a mean DASH of 25 without and 34 with distal (wafer) resection of the ulna.

An arthroscopic assisted technique of foveal reinsertion has been undertaken but the cases are too few and too recent to draw conclusions.

We applied an arthroscopic approach for other conditions as there are SL lesions, scaphoid nonunion, intra-articular fractures of the distal radius, synovial cysts, loose bodies, synovectomy, radial styloidectomy and fixation of the ulnar styloid.

Conclusion: wrist arthroscopy has proven his value as well as a diagnostic as a therapeutic tool,

Paper

Arthroscopy of the wrist has become common practice in the last decenia, however the first experience is relatively young.
We applied this technique – after workshops, literature and learning by doing - in Pellenberg University Hospital as a routine since 1990.

**Diagnosis**

In a first period the value had to be established and we could report in 1994 the occurrence of ligamentous and cartilaginous lesions in cadaver specimen. This was a valuable base for the interpretation of our endoscopic findings. In the same period we evaluated the diagnostic and therapeutic value of the technique.

The growing precision of diagnostic techniques (MRI, arthrography, arthroscopy) and the consequent increase of the diagnosis of cartilaginous and ligamentous lesions of the wrist led us to undertake a detailed anatomical study of the carpus and to extend this study to the search for correlations between these lesions and the radio-ulnar index. Fifty one cadaveric wrists were dissected from an elderly population (mean age of 76 years). Cartilaginous lesions were found in two-thirds of radioulnar joints of the wrist with a marked predominance for the lunate bone (43%). The triangular cartilage of the fibrocartilaginous complex (TFCC) was perforated in 23 wrists (46%). We established a correlation between the radio-ulnar index and perforations of the TFCC (p < 0.05), as well as the thickness of this structure (p < 0.05). The relationship between age and rupture of intrinsic ligaments (p < 0.05), and the radio-ulnar index (p < 0.05) and age was also established. We present our figures, discuss the clinical implications, and draw the following conclusions from this study. 1) The carpus is a complex joint which is subject to age-related degeneration. 2) The large number of cartilaginous lesions observed in this study must be taken into account in the interpretation of MRI and the "over" precise results of arthroscopy.

In order to evaluate diagnostic and therapeutic wrist arthroscopy we analyzed 129 arthroscopies with a follow-up of at least 6 months. Seventy-seven arthroscopies were performed for therapeutic purposes; 52 arthroscopies were diagnostic. There were diagnostic benefits in 55 arthroscopies (42.5%), therapeutic benefits in 29 arthroscopies (22.5%), combined diagnostic and therapeutic benefits in 39 (30%) and no benefits in six (5%). In 65 cases of the therapeutic group (with preoperative diagnosis) the authors found that the arthroscopy had been worthwhile. For the diagnostic group without a preoperative diagnosis, an arthroscopic diagnosis was made in 44 cases. Complications occurred in two patients: one tendon incision over a Kirschner wire in the therapeutic group and one superficial infection in the diagnostic group. De Smet L1, Dauwe D, Fortems Y, Zachee B, Fabry G. J Hand Surg Br. 1996;21:210-2.

In the course of time there was a gradual shift from diagnostic towards therapeutic arthroscopies. The EWAS claimed that arthroscopy is the gold standard for the diagnosis of wrist pain, but we do not agree. Careful physical exams, good radiographs and better MRI investigations can do the job also. In comparison however of arthrography, arthroscopy could reveal more lesions and compared with – routine- MRI the diagnosis of TFCC lesions arthroscopy was far superior. Forty-nine patients with chronic wrist pain were examined by radiocarpal arthrography, followed by radiocarpal arthroscopy. One patient had bilateral involvement. None of these patients showed deformities or lesions on standard and dynamic radiographs. Not all patients who underwent arthrography underwent radiocarpal arthroscopy. Sensitivity of arthrography was 52%, specificity 50%, positive predictive value 92%, and negative predictive value 8% compared with arthroscopy. In this patient group, a very low negative predictive value was found: in 92% of the negative arthrographic examinations an arthroscopic lesion was found. Arthrography of the radiocarpal joint is a good examination for confirming a clinical suspected lesion, but is of limited value when negative. Vanden Eynde S1, De Smet L, Fabry G. Arthroscopy. 1994 Feb;10(1):50-3.

In a retrospective survey we compared the magnetic resonance imaging (MRI) protocols with the arthroscopic findings for triangular fibrocartilage complex (TFCC) lesions. We found a sensitivity of 0.61 and specificity of 0.88 for MRI. The positive predictive value was 0.85 and the negative predictive value was only 0.68. These values are very similar to those in other recent surveys. These findings and the reviewed publications all indicate that MRI cannot replace arthroscopy. Special coils and MRI-arthrography can significantly enhance the specificity and the sensitivity. A negative MRI is not an

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The TFCC

In 1993 we reported an endoscopic technique for repairing the TFCC with initially good outcomes, which was confirmed on later surveys.

Different types of triangular fibrocartilage complex (TFCC) lesions have been described. We propose an arthroscopic repair of the peripheral tear, as it is a tear in the vascular portion of the TFCC. The technique is based on one used for meniscal repairs of the knee, and it is quite easy to perform. Zachee B1, De Smet L, Fabry G. Arthroscopy. 1993;9:242-3.

Ulnar wrist pain due to a lesion of the triangular fibrocartilage complex (TFCC) is frequent. Based on studies of the vascularity, (traumatic) ulnar avulsions can be sutured. Arthroscopic techniques have been designed but results are scarcely published. This is a follow-up study of 52 patients with an ulnar avulsion of the TFCC. All patients were treated with an arthroscopic technique. Evaluation was directed to the subjective outcome, functionality (using the DASH score) and objective parameters. The mean DASH score was 17.3. Pain was absent or minimal in 47 patients. The grip force was 80% of the contralateral side. Based on these findings, arthroscopic repair of the TFCC appears to be a reliable technique. Degreef I1, Welters H, Milants P, Van Ransbeeck H, De Smet L Acta Orthop Belg. 2005;71:289-93 and Milants P, De Smet L, Van Ransbeeck H. Chir Main. 2002;21:298-300.

Although debridement of the TFCC is a common procedure, few outcome studies are available. The outcome is however less favorable than suture techniques.

A retrospective survey for debridement with or without wafer distal ulna resection was performed. Forty six patients responded to a questionnaire on pain, disability and time off work. The mean DASH score decreased from 42 to 28 on average. Thirty two patients were satisfied. The pain was considered severe in 12 patients. There were significant differences in the outcome between debridement only and debridement with wafer resection of the distal ulna. De Smet L, Van Nuffel M, Koorneef P, Degreef I. Acta Orthop Belg. 2014;80:112-5.

In the ulnar impaction syndrome, wafer resection had similar outcomes as the more traditional ulnar shortening.

The outcome of ulnar shortenings was compared to the outcome after arthroscopic wafer resections for ulnar impaction (or abutment) syndrome in patients with a positive ulnar variance. Both surgical techniques are described. The outcome was measured by the DASH score, the visual analogue score for pain and the working incapacity. The mean DASH score in the ulnar shortening group was 26, in the wafer group it was 36. The VAS were respectively 4.4 and 4.6. The working incapacity was 7 months in the ulnar shortening group and 6.1 months in the wafer group. The differences between the two groups were not statistically significant. Vandenberghe L1, Degreef I, Didden K, Moermans A, Koorneef P, De Smet L Acta Orthop Belg. 2012;78:323-6.

Other Indications

Other indications became apparent; the application of an anterior portal is in our opinion an essential tool to evaluate the posterior capsule. This makes the resection of dorsal synovial cysts possible. Palmar cysts are even more simple.

Wrist arthroscopy is not only a diagnostic tool; it has also developed into a valuable treatment alternative for several wrist disorders. All of the standard portals are dorsally located, leaving the dorsal sector of the radiocarpal and midcarpal joint partially invisible. A volar portal has been developed through the bed of the flexor carpi radialis tendon, thus expanding the therapeutic possibilities. We report our personal experience with the use of a volar portal in 28 of 206 (14%) wrist arthroscopies. No technical problems or neurovascular complications were encountered. We think the standardized approach as described is valuable and safe. Van Meir N1, Degreef I, De Smet Acta Orthop Belg. 2011;77:290-3.
Simple good observation can be on the base of a new semiological sign: **frayed ulno-triquetral and ulno-lunate ligaments as an arthroscopic sign of longstanding triquetro-lunate ligament rupture.** In patients with chronic wrist pain of more than 6 months duration, arthroscopy may reveal fraying of the ulno-triquetral and ulno-lunate ligaments. This can be a sign of longstanding triquetrolunate dissociation. We present a prospective study in which frayed ulno-triquetral (UT) and ulno-lunate (UL) ligaments were sought on wrist arthroscopy and correlated with longstanding triquetro-lunate (TL) rupture. Zachee B, De Smet L, Fabry G. J Hand Surg Br. 1994;19570-1

The technique of a capsuloligamentous repair of the scapholunate ligament is a promising technique to deal with these lesions. Carpal fractures, (intra-articular) distal radius fractures and cartilaginous lesions can also be dealt with the technique and the end of possible applications is not yet in view: partial arthrodeses, arthrolysis, arthroplasty and resection of bones are sporadically reported but we are convinced that in the near future the wrist surgery will further evolve towards an arthroscopic discipline similar to knee surgery.
Arthroscopic Reconstruction of the S-L ligament in the III-IV Lesions of Geissler's Classification: a New Way

N. Della Rosa, M. Abate, A. Russomando, A. Landi
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The treatment of scapho-lunate dissociation is a challenging problem. The surgical strategy depending on chronologic and anatomical factors. The trophic condition of the S-L ligament is strictly correlated to the time between the trauma and diagnosis. The wrist's condition (presence of arthrosis and anatomical congruence) and the characteristic of the instability (possible reduction of the DISI and the rotatory subluxation of the scaphoid) must be evaluated before performing any surgical procedures.

In literature there are different and various techniques of reconstruction of the S-L ligament to perform but all techniques have some complications where the stiffness is often present despite of a perfect reconstruction of the ligament.

From the experiences of open surgery of the wrist the new idea to convert the bone-ligament-bone reconstruction of the S-L ligament in arthroscopic method. The concept of a “biologic surgery” and “miniinvasive surgery” thrust us to find a new method of reconstruction of S-L ligament with the conviction that the preservation of the vascularization and the proprioceptive innervation of the wrist would improved the outcomes. The A. present their new, personal and reproducible technique using bone-ligament-bone graft by arthroscopic method. On the basis of our preliminary experience, with 20 cases treated and with a minimum follow-up of one year, the advantages are undeniable. The results were assessed with the use of pre and post-operative clinical and radiographic studies, and measurements of active and passive range of motion (preop average extension 59.9; postop 61.7; preop average flex 63.2; postop 55.4), grip strength, pulp and key pinch strength (preop 13.95 Kg; postop 19.98) and a validate functional test (PHWRL preop 56.25; postop 22.6). The preliminary results thrust us to a cautious optimistic judgement of this new technical possibility.
Untreated wrist sprains can lead to a degenerative articulation in some years, an irreversible SLAC lesion, and a severe disability. The early diagnosis of those lesions is thus necessary. Arthroscopy is proposed by some authors as a reference examination, allowing to palpate the tension of the different extrinsic capsular ligaments of the carpus, in addition with the palpation of the intrinsic scapho-lunate and luno-triquetral ligaments.

The palpation of the extrinsic ligaments has been described, and seems realistic after a reasonable learning curve. However, no study has been published to confirm, by anatomical extra-capsular open approach, the correspondences of the different ligaments arthroscopically checked.

The authors have used three fresh cadaveric wrists, prepared by ablation of the periarticular skin, muscles, tendons, carpal tunnel contents, to compare arthroscopic testing of the carpal extrinsic ligaments to direct extra-articular view of the capsule, and to pursue from outside the movements of the probe. The internal arthroscopic, external dorsal and volar views, showing the portals, and the hook by transparency, give a clear idea of what is traced during arthroscopy.

The findings show that arthroscopic testing allows to palpate the real radio-scapho-capitate ligament, long and short radio-lunate, ulno-lunate and ulno-triquetral, dorsal radiocarpal ligaments within the radiocarpal space, and the radio-scapho-capitate, scapho-trapezial, triquetro-capitate and dorsal intercarpal ligaments within the midcarpal space.

Finally, arthroscopy is a useful technique to confirm the ligamentar status. It provides a precise spectrum of the lesions.
045  **Arthroscopical CapsuloLigamentous Repair**

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**Introduction:**
Scapholunate (SL) stability depends not only on the integrity of the interosseous ligament (SLIOL) but also on extrinsic volar and dorsal ligaments and capsular attachments (DCSS). These structures constitute a true SL complex (SLC). The new EWAS classification of arthroscopical predynamic instability specifies the stage 3 of Geissler and should be influenced with the lesional spectrum of SL instability. The arthroscopic testing of the extrinsic components of SL complex assesses the dynamic status of them and specifies the lesional spectrum of instability. This testing participates in the choice of the repair technique.

**Material and methods:**

**Results and conclusions:**
The dorsal and volar arthroscopic capsuloligamentous repairs are easy procedure. They allow to obtain a closing of the scapholunate widening with only one suture, an immediately arthroscopic stabilisation, an important improving of pain, without stiffness. This procedure is indicated to treat symptomatic lesions of the scapholunate complex when they are perfectly reducible (Garcia Elias stage 2 to 4). The type of arthroscopic repair (dorsal, volar or combined) is chosen according to the lesional topography of SLIOL and extrinsic components of scapholunate complex. Its clinical outcome is similar to the open capsulodesis. The radiologic follow up is too short and then insufficient. A future long term analysis will be necessary.
Scapholunate Stabilization by Dynamic Extensor Carpi Radialis Longus Tenodesis

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Scapholunate instability is the most common form of carpal instability. Varying degrees of instability have been defined, ranging from predynamic and dynamic to static instability with marked volar flexion of the distal scaphoid and subluxation of its proximal pole over the dorsal tip of the radius resulting in scapholunate advanced collapse deformity. Most surgeons agree that operative intervention is indicated but no clear consensus exists on the best treatment. Limited carpal arthrodesis, dorsal capsulodesis or tenodesis can be performed to prevent excessive flexion of the scaphoid with varying rates of success, however wrist mobility remains an important disadvantage. An alternative to these procedures is the dorsal dynamic tenodesis of the scaphoid using the extensor carpi radialis longus tendon. A safe and simple procedure that enhances the extension forces on the scaphoid in all wrist position. The procedure is minimally invasive and offers some technical advantages pushing the indications not only for symptomatic static scapholunate instability but also in case of dynamic instability.
The four corner fusion is a well known saving procedure for SLAC and SNAC II-III. Usually the procedure is a open procedure, sometimes a diagnostic arthroscopy is done before to evaluate the cartilage damage and to decide if a proximal row carpectomy or a four corner fusion will be done. Inspirated by PC Ho, Hong Kong, we started with a arthroscopically four corner fusion in 2011.

**Technique**

From the beginning we have every time small changes in technique. Finally now we do first the arthroscopic resection of the mediocarpal joint. Than we resect the scaphoid, over a small palmar incision at the STT-joint, using a “carpal stick”. Than put the cancellous bone chips from the scaphoid using a nose speculum to put in the mediocarpal resected space. Open the tourniquet and do a temporally transfixation from distal to proximal capitate – lunate, using a joy-stick in the lunate for reposition. Than do the final osteosynthesis with two or three headless bone screws from distal to proximal: first capitate-lunate; than hamate-lunate, than screw or k-wire from triquetrate-capitate.

**Results**

One patient we have a screw broken and need to resolve the arthrodesis with a plate, here it seems to be a technical mistake, because maybe we put compression on the screw. Finally all other arthrodesis are healing in time. To screws were removed due to a slight overlying of the head. The patients were satisfied with the function and pain relieve (as mostly in corner fusion). It seems that the postoperative results in ROM will be nearly as the preoperative ROM, probably due to less scaring on the dorsal aspect of the wrist. Operation time is longer than in open procedure, meant time 150 min. The most time consuming is the percutaneous osteosynthesis.

**Open Questions**

Do we get an earlier bone healing? Is the ROM better than in open procedure? Can we always reduce the operation time?
048 Three Corner InterCarpal Arthrodesis

M. Colman, W. El Kazzi, P. Salvia

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Abstract not received in due time.
Focal chondral lesion is a common cause of chronic wrist pain. The best treatment remains unknown. We developed a technique of arthroscopic transplantation of osteochondral autograft from the knee joint to the distal radius with satisfactory clinical result.

Between Dec 2006 and Dec 2010, we have operated on 4 patients who were diagnosed to have post-traumatic localized osteochondral lesion over the dorsal lunate fossa of the distal radius. There were 3 male and 1 female patients of average age 31 (range 24-41). The affected sides were the dominant right wrists. They all presented with chronic central dorsal wrist pain and loss of motion after injury episode. The average duration of symptom was 28.3 months (range 11-71 months). All patients had pre-op imaging including CT scan and/or MRI. The definite diagnoses were confirmed by arthroscopy. In the first 3 cases, the lesions were located at the dorsal lunate fossi, measuring 6 x 8mm, 4 x 8mm and 4 x 6 mm respectively. In the last patient, the lesion extended from dorsal to central lunate fossa and measured 8 x 10mm. All patients were assessed by an occupational therapist before the index procedures, during and at final follow up. In 3 patients, second look arthroscopy was performed to directly evaluate the status of the chondral graft. Biopsy was performed in one case.

The transfer operation was performed under general anaesthesia. Vertical joint traction force of 4-6 Kg was applied through a wrist traction tower. Synovitis over dorsal lunate fossa was debrided with 2.0mm shaver to uncover the underlying osteochondral lesion. We employed the Osteoarticular Transfer System (OATS; Arthrex, Naples, FL) for the harvest and transfer process. A 6mm recipient harvester was inserted into the joint through 3/4 portal. With the wrist flexed passively, the trephine was driven into the osteochondral defect for 10-12mm and a cylindrical plug of bone containing the osteochondral defect was removed.

The donor site was the knee of the non-dominant leg. Through a small incision, a 6mm donor harvester was inserted to the sulcus terminalis of the lateral femoral condyle to a depth slightly longer than that in the wrist.

A short transparent plastic delivery tube containing the osteochondral plug was then inserted into the defect through the 3/4 portal gently with the aid of a rotating dial. A plastic tam could be used to press-fit the plug. Mis-match at the junction was trimmed with an arthroscopic knife. The graft was generally very stable and no internal fixation was required. A wrist splint was prescribed for 2-4 weeks and the patient was instructed to perform gentle active wrist motion from day 3. Load bearing of the wrist was discouraged for the first 6 weeks.

In all cases, the osteochondral grafts were shown by CAT scan or MRI to have complete incorporation to the host bone by 3-4 months post-operation. Second look arthroscopy at 6 -9 months post-operation in 3 patients confirmed preservation of normal cartilage at the grafted area. There was a small rim of junction defect of 1-2mm between the graft and the host cartilage. Biopsy of the grafted area in one patient confirmed hyaline cartilage. In one patient, a third look arthroscopy at 29 months post-operation showed complete coverage of the junction defect by hyaline cartilage.

At the final follow up of average 52.3 months (range 24-83 months), all patients showed improvement in the wrist performance score (pre-op 27.5 ± 6.4, post-op 39.0 ± 1.7 out of a 40 points scale) and pain score (pre-op 9.5 ± 2.2, post-op 0.5 ± 0.9 out of a 20 points scale). Grip strength improved from 62.6 ± 9.0 % to 98.2 ± 7.6 % of the contra-lateral side. Motion improved from 115.5 ± 28.8 ° to 131.3 ± 23.6°. Two patients resumed their original works and two other patients could not do so due to concomitant or newly occurred medical problem. They were all satisfied with the procedures. Surgical scars were inconspicuous. X ray, CT scan and/or MRI showed good graft incorporation, no loss of joint space or other sign of degeneration. There was no complication.

In conclusion, focal osteochondral lesion is a common cause of chronic wrist pain. Wrist arthroscopy is the gold standard for diagnosis to determine the precise nature, location and extent of the lesion.
Osteochondral autograft transfer is an effective treatment to restore the normal hyaline cartilage and the articular environment. Our new arthroscopic approach enables autograft transfer without violating the soft tissue envelop and hence favours graft healing and rehabilitation. Due to limitation by the current instrumentation, the size of the osteochondral plug is restricted to 6mm. In the future, more patients can be benefitted if the instrument can be down-sized so that multiple grafting is made possible.
SESSION 10: WRIST (2)

050 Arthroscopical Debridment and Grafting of Intra-Osseous Ganglia of the Lunate
C.K. Goorens, S. Geeurickx, B. Staelens, Th. Scheerlinck, J. Goubau (Tienen, Brussels, Belgium)

051 Minimally Invasive Treatment of Scaphoid Fractures and Nonunions
F. Verstreken (Deurne, Belgium)

052 Comparison of Bioreplaceable Joint Prosthesis with Trapeziectomy and AbLP Arthroplasty in the Treatment of the Osteoarthritis at the CMCj level. A Randomised Parallel Groups Study in Adult Subjects
N. Della Rosa, A. Leti Acciaro, A. Marcuzzi, A. Landi (Modena, Italy)

053 Physiotherapy in Trapezio-Metacarpal Osteo-Arthritis
Ch. Robert (Brussels, Belgium)
Intraosseous ganglia of the lunate are relatively rare. When persistent pain and discomfort occur, surgical options may be chosen.

Two such cases are described. Arthroscopical debridment and grafting was performed after typical radiographic and bone scan findings were assessed. The intraosseous cyst was drilled and autologous bone was impacted in the cavity by using of an appropriate cannula under arthroscopic guidance.

No complications occurred. Shortterm residual pain was minimal (visual analogue scale 2) and mobility and grip strength increased to 90% compared to the contralateral side after 4 months. Professional and recreational activities were fully recuperated after 4 months, leading to high patient satisfaction. Control MRI scan showed adequate incorporation of bone graft.

No recurrence of symptoms of cyst formation was inspected after 1 year of follow-up.

Current literature is discussed. The technique of arthroscopically debridement is a valid alternative to the traditional treatment of open curettage and bone grafting, possibly leading to decreased ongoing pain and stiffness of the wrist, with minimal morbidity and recurrence of symptoms during the follow-up period. Functional recovery and excellent cosmesis resulted in high patient satisfaction.
Eighty percent of all scaphoid fractures occur at the waist. Nondisplaced waist fractures are stable and are traditionally treated with 8 to 12 weeks of cast immobilization. This treatment has shown to lead to union rates varying from 88% to 95%. However, a long period of cast immobilization is not appealing to many young, active people, who are the ones who generally sustain this injury. As an alternative to conservative treatment, percutaneous screw fixation has recently gained popularity. This technique shows at least comparable union rates to conservative treatment and avoids prolonged immobilization. In addition, percutaneous screw fixation allows for a more rapid return to work and athletic activities.

Several studies have investigated determinants for screw fixation strength in scaphoid fractures. These studies show that a centrally placed screw is stronger than one placed eccentrically. Furthermore, fixation strength is proportional to screw length and to the purchase of screw threads in the subchondral bone. Because of the complex anatomic shape of the scaphoid, internal fixation is a technically demanding procedure. When using a standard volar percutaneous technique, central screw placement at the distal pole is hindered by the trapezium and suboptimal positioning of the screw is often observed (FIG). The transtrapezial allows more accurate central screw placement, and excellent results have been reported in the literature.

Displaced scaphoid waist fractures need to be reduced before fixation, and often this can be done using closed or arthroscopy assisted manipulation. CT scans have been shown to be superior to radiographs for the evaluation of fracture displacement, which is the most important factor to determine fracture union.

Percutaneous fixation can also be used in a selected group of delayed unions or nonunions of the scaphoid, as long as there is no important cyst formation, sclerosis or displacement of the fracture fragments (<2 mm). Optimal screw position and rigid fixation is even more important in these cases than in acute fractures.

If the nonunion is well aligned, but has caused important cyst formation, cancellous bone graft, DBM (demineralized bone matrix) or BMP (Bone Morphogenetic Protein) needs to be inserted at the nonunion site to increase the healing potential. This can easily be done percutaneously or arthroscopy assisted and in combination with rigid percutaneous screw fixation. The use of a bone biopsy needle allows minimally invasive prelevation of cancellous bone graft from the distal radius, olecranon or iliac crest.

When sclerosis, synovial tissue and fluid is present at the nonunion site (pseudarthrosis), it needs to be resected to allow bony healing. The use of trephine burs of matching diameter (Leung technique) allows both resection of the sclerotic tissue and prelevation of the appropriate size cylindrical cortico-cancellous bone graft, in a minimally invasive way. This technique facilitates the procedure, and can also be used when there is a mild humpback or flexion deformity that needs to be corrected.

In cases of failed screw fixation, with osteolysis around the implant and at the nonunion site, the use of a mini scaphoid plate combined with bone grafting may allow solid fixation and obviate the need for more invasive salvage procedures such as PRC or four corner fusion.
Fig: Scaphoid screw position
Comparison of Bioreplaceable Joint Prosthesis with Trapeziectomy and AbPL Arthroplasty in the Treatment of the Osteoarthrosis at the CMCj level. A Randomised Parallel Groups Study in Adult Subjects

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Our Unit had attended in an European project, coordinated from Tampere University, Finland, regarding new “biodegradable” prosthesis. The investigational bioreplaceable joint prosthesis consists in porous, fibrous spacer (scaffold), made of L and D lactic acid copolymers with L,D-monomer ratio 96 to 4 (PLDLA). The primary aim of this study was to compare the new biodegradable “scaffold” in osteoarthrosis subjects at the CMCj level to the patients treated with trapeziectomy and arthroplasty with ABLP tendon. The secondary aim is to estimate (follow-up 5 years) the performance and the life of this scaffolds.

The study had been carried out as a randomised, multi-centre parallel groups study with two treatment groups.

The surgical technique for the implantation of the “scaffold” had been performed by our personal technique: mini-incision at the CMCj level, trapeziectomy and positioning of the prosthesis stabilizing with a bone anchoring device to the distal pole of the scaphoid and distally to the base of the first metacarpal by a double suture. The Aa had performed 42 trapeziectomies, from November 2004 to June 2006, adding the scaffolds in 25 cases, according to personal surgical technique, and the AbPL arthroplasty in the 17 cases of the controlled group.

Actually the results in a groups of 20 patients without a follow-up of 8 years, have shown a significative improvement of the results in the “scaffold group” compared to the control group (Jamar test of 35%, pinch test of 16%, Kapandji test of 12%). In the VAS scale the impairment of the perceived pain has been of 70% in the scaffold group compared to 40% of control. The report shows o better results in scaffold group to the controlled group also in a long term follow-up.
Physiotherapy in Trapezo-Metacarpal Osteo-Arthrosis

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