Recent Advances in Hand and Microsurgery

Dr. Stephen WC Wu  MBBS (HK), FRCS (Edin), FRACS, FHKCOS, FHKAM (Orthopaedic Surgery)
Director of Orthopaedic and Sports Medicine Centre,
Hong Kong Sanatorium and Hospital

I. Minimal invasive surgery

The concept of minimal invasive and minimal access surgery is not new in Orthopaedics. Arthroscopic treatment of knee joint diseases became popular in the early 80s. Similar concept and instruments have been extended to treat joint diseases of the shoulder, elbow, wrist and other joints.

The same concept is also applied to treatment of many trauma problems in the upper limb.

A. Endoscopic carpal tunnel release (ECTR)

MacDonald, et al. reported 18.3% complication rate for 186 cases received open carpal tunnel release. Two commonest complications included incomplete release of the transverse carpal ligament and the damage of the palmar cutaneous branch of median nerve. Other less common complications included palmar haematoma, bowstringing of flexor tendons, adherence of flexor tendons, reflex sympathetic dystrophy and hypertrophic scar. Other less common complications reported in the literature included damage to the median nerve, motor branch of median nerve, digital nerve and the tendons.

Endoscopic carpal tunnel release (ECTR) was first introduced in 1989 by Okutsu and Chow. Its introduction was mainly because of the maturity in the development and skills of arthroscopic surgery, a natural move in the advance of science and the aims to improve the results of OCTR.

The advantages of this treatment method are: (1) The scars are much better as the skin incision could be made along the proximal wrist crease and the palm crease (Fig. 1); (2) Less palm tenderness; and (3) Faster recovery with more rapid return of strength and resumption of work.

The main drawbacks are: (1) The need of proper and longer training; (2) The possible complications of division of the median nerve or its branches; (3) Damage of the superficial palmar arch artery leading to haematoma formation; and (4) More costly.

Boeckstyns, et al. reviewed 54 publications through Medline search from 1983 to 1996 comparing OCTR and ECTR. There were 9516 cases of ECTR and 1203 cases of OCTR. The summary of complications are as shown in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>ECTR</th>
<th>OCTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of permanent nerve damage</td>
<td>0.29%</td>
<td>0.17%</td>
</tr>
<tr>
<td>Main trunk, large nerve damaged</td>
<td>more common</td>
<td>None</td>
</tr>
<tr>
<td>Transient nerve disturbances</td>
<td>4.7%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Complications related to tendon, vessel, infection</td>
<td>similar</td>
<td>Similar</td>
</tr>
</tbody>
</table>

Table 1 Complications of the review of 54 publications on carpal tunnel syndrome

After more than 15 years of development, the complications rate of ECTR in trained hands is about the same as in OCTR.

B. Scaphoid fractures

In the past, acute scaphoid fractures had been treated with plaster immobilisation. The classic teaching was to immobilise the wrist until there was radiological evidence of fracture healing. This usually takes more than 12 weeks or longer. Despite the long duration of plaster immobilisation, one often has difficulties in interpreting the radiographs and is not sure of the status of fracture healing unless a CT scan is done. This obviously cannot be a routine practice. Many will end up as nonunion of the fracture.
In the past 10 years, Hong Kong surgeons have been pioneering the use of percutaneous cannulated screw fixation (PCSF) in the treatment of this fracture (Fig. 2A, B). The union rate can be up to 100% for stable fractures. The advantages include: (1) no plaster immobilisation is required post-operatively and the patient feels much more comfortable; (2) good union rate; and (3) the operation can be done under regional anaesthesia.

While we have developed an effective means to treat acute scaphoid fractures, one should be alert of the possible concomitant carpal ligament injuries in these patients. In our study of 52 patients having acute scaphoid fractures, 18 patients (34%) had concomitant carpal ligament injuries. The presence of significant carpal ligament instability is the poor prognostic factors for this combined injury. We advocated arthrogram or arthroscopy should be done at the same time while we are fixing the acute scaphoid fractures. Significant carpal ligament injury could then be detected and treated accordingly.

**C. Injectable bone substitutes for treatment of distal radius fractures**

Distal radius fractures are common but their treatment remains challenging. Treatment concepts have evolved over the years, from nonintervention to minimal intervention, to surgical techniques of increasing complexity. Minimal invasive means to fix the unstable or displaced fractures have definite advantages, the main problem is how to maintain the stability in osteoporotic or comminuted fractures. The recent introduction of bone substitutes and injectable calcium sulphate graft has great potential in treatment of this fracture. The latter can be injected in liquid form using a small incision and it is used to fill up defects in osteoporotic fractures. Once hardened, it enhances stability of the fixation.

**D. Wrist arthroscopy**

Its role is expanding in the treatment of wrist joint diseases. Triangular fibrocartilage injury and other ligamentous injuries of the wrist are common and many can be managed with this technique. Other applications include arthroscopic assisted treatment of scapholunate instability, scaphoid nonunion and Kienbock’s disease.

**E. Elbow arthroscopy**

Persistent synovitis of a single joint is sometimes encountered in rheumatoid arthritis patients despite adequate medical treatment with disease modifying agents. Arthroscopic treatment of elbow synovitis is particularly good and useful. Several small incisions would be good enough for the whole procedure and the results are good. However, it carries definite risk in terms of possible damage to the adjacent nerve and vessels.

Persistent pain in osteoarthritis of the elbow can also be treated with arthroscopic techniques. Elbow arthroscopy is also useful in the management of intra-articular tumours and fractures.

**II. Joint replacement**

**A. Total elbow replacement**

Total elbow replacement has been used to treat advanced osteoarthritis or rheumatoid arthritis of the elbow joint since the 80s. The results are promising. Morrey reported 92.4% survivorship of the implanted prosthesis at 10-year follow-up. However, this procedure is technique demanding and carries definite risk. The complication rate ranged from 22-45% in different series.

**B. Total wrist replacement**

In the past, the main problems with different total wrist arthroplasties are loosening of the distal component and dislocation of the prosthesis. At present, many new designs of total wrist arthroplasty are developed. The trend is to use screw fixation of the distal component and it is found to diminish loosening of the prosthesis. The results are promising.

**C. Finger joint replacement**

Silicone finger joint replacement has been used to treat advanced finger joint arthritis of rheumatoid arthritis patients since the 60s. We are still using these though the materials and the prosthesis design have improved. New prostheses made of pyrocarbon, metal and polyethylene are under trial now.

**III. Microsurgery**

Since the world’s first successful replantation of the forearm in human in 1963 by Chen ZW in China, microsurgery has developed significantly in the past 40 years. The emphasis on replantation now is not on the success rate but on the functional outcome.

Many flaps had been reported in the last 30 years. In the field of Orthopaedics, the role of reconstructive microsurgery using flaps has been mainly in the treatment of the following diseases: (1) open fractures and serious trauma including burn; (2) osteomyelitis; and (3) tumours. The applications of these microvascular techniques in the treatment of tumours have been the main emphasis at present. The success rate of limb salvage in the treatment of sarcomas has steadily improved. With the improvement in the understanding of the vascular anatomy of different tissues in the body and the technological advances in microsurgery, we are moving towards using ‘free-style’ free flap to meet the recipient need and decrease the donor site morbidity.

**Nerve surgery**

Results of nerve repair or reconstruction after trauma have been significantly improved. Use of microsurgical
IV. Other new developments

A. Joint instability

The ligaments around a certain joint must be loose in joints with clinically significant instability. In the past, reconstruction of the lax ligament not uncommonly ends up with unsatisfactory results. The main problem lies in the unsatisfactory healing of ligamentous or tendon tissues to bone. Bone-ligament-bone graft used to reconstruct torn anterior cruciate ligament of the knee is found to be a reliable method. It has become the gold standard for comparison of different methods of reconstruction. Same concept has been applied in the treatment of joint instabilities in the hand and wrist. Bone-ligament-bone grafts from the distal radius was used to treat scapholunate instability with good results. The author has also used bone-ligament-bone graft harvested from the iliac crest to reconstruct finger joint instabilities at the metacarpophalangeal, proximal interphalangeal and distal interphalangeal joints. The results are again very satisfactory (Fig. 3A, B, C).19

B. Tendon surgery

A lot have been developed recently in the methods of surgical repair of tendons. The trend is towards enhancing strength of the repair and hence, allows early rehabilitation. Stronger sutures are also developed for this purpose. The surgical method preferably should be simple and easy to apply.20

References
5. Boeckstyns MEH, Sorensen AI. Does endoscopic carpal tunnel release have a higher rate of complications than open carpal tunnel release? J Hand Surg 1999; 24(1):9-15
8. Wong TC, Yip TH, Wu WC. Carpal ligament injuries with acute scaphoid fractures – A combined wrist injury. J Hand Surg 2002B. Accepted for publication

MCHK CME Programme Self-assessment Questions

Please read the article entitled “Recent Advances in Hand and Microsurgery” by Dr. Stephen WC Wu and complete the following self-assessment questions. Participants in the MCHK CME Programme will be awarded 1 CME credit under the Programme for returning completed answer sheet via fax (2865 0345) or by mail to the Federation Secretariat on or before 31 October 2005. Answers to questions will be provided in the next issue of The Hong Kong Medical Diary.

Questions 1- 10: Please answer T(True) or F(False).

1. Incomplete relief of symptoms after open carpal tunnel release is most commonly due to incomplete release of the transverse carpal ligament.
2. Endoscopic carpal tunnel release requires little training and has low rate of complications.
3. The main problem of treating acute scaphoid fractures by plaster immobilisation is the uncertainty of fracture union in the follow up radiographs and hence requires long duration of plaster immobilisation.
4. Percutaneous cannulated screw fixation of acute scaphoid fractures has a lower rate of fracture union comparing with treatment by plaster immobilisation.
5. It is not common to have concomitant carpal ligamentous injuries in acute scaphoid fractures.
6. In treating distal radius fractures, the use of bone substitutes is one good method of filling up the bone defect in osteoporotic fractures.

7. Total elbow replacement is a standard method used to treat advanced arthritis of the elbow joint in rheumatoid arthritis patients.

8. In orthopaedics, flaps are mainly employed to treat difficult problems in open fractures, osteomyelitis and primary bone and soft tissue sarcomas.

9. The results of surgical treatment of brachial plexus injuries are still poor and bring little help to patients.

10. The trend in tendon repair surgery is to use stronger sutures and employ stronger repair method to allow early mobilisation of the finger.

ANSWER SHEET FOR OCTOBER 2005

Please return the completed answer sheet to the Federation Secretariat on or before 31 October 2005 for documentation. 1 CME point will be awarded for answering the MCHK CME programme (for non-specialists) self-assessment questions.

Recent Advances in Hand and Microsurgery
Dr. Stephen WC Wu  MBBS (HK), FRCS (Edin), FRACS, FHKOS, FHKAM (Orthopaedic Surgery)
Director of Orthopaedic and Sports Medicine Centre,
Hong Kong Sanatorium and Hospital

1 2 3 4 5 6 7 8 9 10

Name: _____________________________________________________ HKID No. ___ ___ - ___ ___ ___ ___ X X (x)
Signature: _____________________________  Contact Tel No.:_________________________

Answers to September 2005 issue

Positive Ageing
1. a) F  b) T  c) T  d) F  e) F
2. a) F  b) F  c) F  d) F  e) F

Federation Golf Tournament

The Federation is pleased to announce the second event in celebration of our 40th anniversary. It will be the first Federation golf tournament to be held at the Kau Sai Chau Golf Course on 12th October, 2005. WE have booked the South course, and golf carts will be provided. We anticipate a large turnout as the weather will be cooler and nicer in mid October. There will be prizes for the winners, and longest drive, closest to pin, etc.

Participants should form teams of 4 according to the medical society they belong to. The Stableford point system will be used to calculate the scores. The champion team will receive the Federation Cup

For details please consult the Federation website at www.fmshk.com.hk