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Abstract Wrist post traumatic disorders are numerous. They can affect young and old patients, but also distal radial parts or intra carpal joints. Several after-effects can generate many different disorders. The arthroscopic approach allows for simple treatment of some post traumatic disorders with good results and a very low morbidity. The authors present their own experiences in certain indications, some techniques and the results of these procedures.

Résumé Les séquelles post traumatiques du poignet son très fréquentes. Elles peuvent atteindre les plus âgés comme les plus jeunes mais aussi le radius distal et le massif carpien. De nombreuses séquelles sont à l'origine de différentes pathologies. L'arthroscopie du poignet permet une prise en charge simplifiée dans de nombreux cas avec de bons résultats au prix d'une morbidité faible. Les auteurs présentent leur propre expérience dans certaines indications, certaines techniques et les résultats de cette prise en charge.

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2 **Arthroscopic management of post traumatic wrist sub-acute**
3 **and chronic disorders**

4 **M. Levadoux · M. K. Nguyen · Ch. Gaillard ·**
5 **Ch. Michaut · I. Ausset**

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26 auteurs présentent leur propre expérience dans certaines
27 indications, certaines techniques et les résultats de cette
28 prise en charge.

29 **Mots clés** Poignet · Carpe · Arthroscopie

Introduction

Wrist traumas are very common [9]. Operative and non-oper-
ative management can be used for the treatment of these kinds
of lesions. Several anatomical structures can be injured during
wrist traumas. Emergency treatment is not always effective
and these traumas can be the cause of many after-effects. The
surgical treatment of these problems can be achieved by an
arthroscopic approach. We will disclose the different arthro-
scopic solutions for the treatment of these lesions and the
results that we have obtained in our own experiments.

Material and methods

Material

Between January 2000 and May 2006, our surgical team
performed 200 wrist arthroscopies. Twenty percent were
diagnostic procedures, 50% were for the treatment of acute
wrist traumas and 30% for post traumatic sub acute or
chronic disorders. These 30% represent 65 patients, 45 men
and 20 women, average age of 42 years (17–72). The wrist
disorders were separated into 40 intrinsic ligaments tears
(scapholunate and lunotrichetral lesions), 9 radio-carpal
and intra-carpal arthritis, 11 Ulna carpal abutment syn-
drome, and 5 other reasons (post traumatic wrist stiffness,
synovectomy and mid-carpal shrinkage).

Methods

Arthroscopic procedure

The patients were always operated on in an out-patient
basis under local anaesthesia. The arm was laid on the table

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57 and the hand on in line traction (5–7 kg). We used a 2.4 mm
58 arthroscope 30° angled. Both joints, radio- and mid-carpal,
59 were systematically explored. The small portals were not
60 closed.

61 *Indications*

62 We separated the indications into five sections:

- 63 • TFCC chronic tears
- 64 • Treatment of intrinsic ligaments tears (debridement, KW
65 pinning, scapholunate screwing)
- 66 • “Ectomy” (radial styloidectomy, wafer procedure)
- 67 • Partial intra-carpal prostheses.
- 68 • Others techniques (arthrolysis, synovectomy and midcar-
69 pal shrinkage).

70 *TFCC tears*

71 Arthroscopic procedure allows a trimming of old TFCC
72 Palmer 2C or 2D lesions [11]. A 3/4 portal was used for
73 vision and a 6 R portal for instrumentation. A 2-mm
74 Shaver blade was used to remove the injured tissue with or
75 without the use of endoscopic basket forceps. The goal
76 was to leave only the healthy part of the fibro cartilage.
77 The patients were able to move the wrist immediately
78 with only dressing changes every 2 days for 10 days. No
79 specific physiotherapy was necessary for any of the
80 patients (Fig. 1).

81 *Treatment of sub acute or chronic intrinsic ligament tears*

82 Scapholunate or lunotrichétral ligament can be injured dur-
83 ing wrist traumas [10, 11]. Emergency arthroscopic proce-
84 dures have shown the frequency of these injuries [3, 6].
85 Unfortunately, most of the time, because the arthroscopy
86 was not effected immediately, the intrinsic ligament lesions
87 were not distinguished and the disorders can become sub-

acute, then chronic. Arthroscopic procedure allows the 88
diagnosis, the reduction and the temporary pinning of these 89
lesions before 3 months. After this deadline, pinning was 90
no longer efficient and a screwing can be performed. 91

Lunate reduction The surgical procedure necessitates an 92
introductory time of lunatum reduction (VISI in case of 93
lunotrichétral ligament injury, DISI in case of scapholunate 94
injury). A dorsoradio-lunate Kirchner wire KW can be 95
inserted to preserve the reduction. The treatment can be 96
performed under radio-carpal, mid-carpal arthroscopy and 97
fluoroscopic control. 98

Immobilisation In case of sub-acute lesions (less than 99
3 months), it was possible to do a simple scapholunate or 100
luno trichétral pinning (Figs. 2, 3). Two KW were intro- 101
duced from the radial side of the scaphoid (scapholunate 102
injury) or from the ulnar side of the trichetrum (luno 103
trichétral injury) to the lunatum . The reduction KW were 104
removed at the end of the procedure and the radial part of 105
the scapho-lunate wires were curved and buried under the 106
skin. This treatment was associated with an immobilisa- 107
tion by a single use customised splint of the wrist for 108
6 weeks. At that time KW can be removed under local 109
anaesthesia. 110

In case of chronic lesions [5] (more than 3 months), the 111
treatment was different for the radial side or ulnar side 112
lesion. In case of lunotrichétral injury, pinning can also be 113
performed as described above. In case of scapholunate 114
instability, a canulated screwing can be realised between 115
the scaphoid and the lunatum (Fig. 4). The same splint was 116
performed. 117



Fig. 1 TFCC chronic lesion



Fig. 2 Lateral view of a scapholunate pinning



Fig. 3 Frontal view of a lunotrichetal pinning



Fig. 4 Scapholunate screwing



Fig. 5 Frontal view of a scaphoradial impingement



Fig. 6 Same view after arthroscopic styloidectomy

118 *Ectomy*

119 In some cases of post traumatic disorders articular abut-
120 ments can occur between two articular parts.

121 In the case of post traumatic arthritis, radial styloid can
122 become long and sharp, and provoke a radio-scaphoid
123 impingement. A styloidectomy can be performed by arthro-
124 scopic way.

125 *Styloidectomy* In cases of SNAC or SLAC wrist, arthro-
126 scopic styloidectomy can be effected. The use of a 2.5- or

2.9-mm bur is necessary and allows the removal of the 127
radial styloid without injury of the surrounding soft tissue 128
[2]. A 3/4 portal is necessary for vision and a 1/2 portal for 129
instrumentation. A 3-mm resection is enough to attenuate 130
the radio-scaphoid impingement and to prevent the biome- 131
chanical conditions of wrist working (Figs. 5, 6). No post 132
operative immobilisation is necessary and healing is rapid. 133

Wafer procedure In many cases of distal radius fracture, 134
operative or non-operative treatment, perfect reduction is 135
impossible because of the crush of the radial cancellous 136
bone. The effect was an artificial radial shortening and a 137
possible ulno-carpal abutment syndrome [5] (Fig. 7). Many 138
surgical procedures can be used to treat this problem but 139
some of them are complex. The arthroscopic approach [4] 140
allows the removal of the distal part of the ulna while 141
respecting the radio-ulnar joint. Most of the time a TFCC 142

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Fig. 7 Frontal view of an ulno carpal abutment syndrome



Fig. 9 Frontal view of a scaphoid non-union

143 Palmer 2D was identified and trimmed around the hole. The
 144 bur can remove the damaged part of the ulnar head cartilage
 145 and the underlying bone (Fig. 8). So, the ulno-carpal
 146 impingement can be treated in this way. No splint is neces-
 147 sary and physiotherapy can start immediately.

148 *Partial intra-carpal prostheses*

149 In cases of scaphoid fragmentation and necrosis of the
 150 proximal pole with scaphoid, non-union etiologic treatment
 151 with a graft was very difficult to perform (Fig. 9). When



Fig. 8 Same patient after wafer procedure under arthroscopy

diagnosed on an elderly patient with pain but with good
 range of movement, a proximal pole scaphoid pyrocarbon
 implant can be inserted by an arthroscopic approach after
 intra-articular bone cleaning [8]. A 3/4 portal is necessary
 for vision, a 1/2 portal and a MR portal for instrumentation.
 The use of a 2.5- or 2.9-mm bur was necessary as it allows
 for a perfect adaptation of the Pyrocarbone implant by the
 remaining part of the scaphoid. The proximal fragmented
 part was initially removed and the implant “socket” was
 perfectly adapted with the bur for the prosthesis. Then the
 implant can be inserted by a dorsal 1 cm surgical percuta-
 neous incision (Fig. 10). A simple palmar splint is worn for
 two weeks. Physiotherapy can begin the day after surgery.

Other techniques

Post traumatic stiffness was frequent after wrist trauma. An
 arthroscopic approach allows for dorsal liberation and a
 good recovery of wrist mobility. A 3/4 portal was necessary
 for vision and a 4/5 for instrumentation (arthroscopic for-
 ceps and shaver).

On the other hand, in some cases of mid-carpal trauma an
 instability can occur and provoke a mid-carpal pain. The
 shrinkage of the palmar capsule can resolve the problem and
 treat the instability. A 3/4 portal was necessary for vision and
 a 4/5 for instrumentation (arthroscopic electrocautery).

Results

We regret, however, two post operative complications, (1)
 partial brachial plexus paraesthesia spontaneously resolved



Fig. 10 Same patient after implantation of a partial scaphoid prosthesis

179 in 2 days and (2) sympathetic algodystrophy without any
180 after effects after 2 months.

181 TFCC tears

182 The ulnar pain didnot totally disappear after the surgery but
183 became moderate and admissible for all patients. The ROM
184 stayed unchanged.

185 Treatment of sub acute or chronic intrinsic ligament tears

186 In cases of sub-acute disorders, the results are good in all
187 patients; pain-free wrists in 80% and 20% feeling only
188 moderate pain when doing heavy manual work. ROM
189 increased after surgery in 40% and did not change in
190 60%. Post operative X-rays didnot show any recurrence
191 of VISI or DISI. Grasp and pinch increased from the pre-
192 operative level in 60% and returned to the initial level for
193 the others.

194 In case of scapholunate chronic instability, the screwing
195 didnot resolve the scapholunate disorder. After 3 months,
196 we observed that the distal part of the screw had burrowed a
197 hole inside the lunate around the distal part of the screw.
198 All screws were removed and another surgical procedure
199 was being considered.

200 Ectomy

201 For the radial styloidectomy the result was good for the
202 pain. The arthroscopic procedure allowed for a recovery of
203 a pain-free wrist but didnot change the ROM. Grasp and
204 pinch didnot increase after the surgery.

For the wafer procedure, all patients have claimed that 205
the post operative pain decreased in all cases. Likewise, 206
strength increased in 60% and stayed unchanged in 40%. 207
ROM was not affected by the surgery especially the prono- 208
supination which was full before and after the surgery. 209

Partial intra-carpal prostheses 210

In each case, the ROM was unchanged but the pain disap- 211
peared. All the patients declared that after the surgery they 212
were able to do manual tasks more easily. Grip and strength 213
remained unchanged. 214

Other techniques 215

In all cases of post traumatic stiffness, the ROM increased 216
after wrist arthroscopy especially for the flexion. Extension 217
didnot progress after the surgery. Radial and ulnar inclina- 218
tion but also pronation and supination remained unchanged. 219

In the case of mid-carpal post traumatic painful instabil- 220
ity, the shrinkage was very efficient for the pain and also the 221
strength. The laxity disappeared partially after the surgery 222
and the patient recovered the initial function of his wrist. 223

Discussion 224

Wrist post traumatic after effects are very frequent. The 225
arthroscopic surgery allows for safe surgery with few compli- 226
cations. Most of the time, the surgery reduces pain and 227
increases use, but unfortunately, the ROM remains 228
unchanged except for the treatment of post traumatic stiff- 229
ness and mid-carpal instability. 230

Arthroscopic treatment of chronic TFCC Palmer 2C or 231
2D permits pain reduction but the overlapping between 232
ulnar head lunate and trichetrum remains identical and also 233
the natural history. The wafer procedure under arthroscopy 234
allows for the management of chronic TFCC tears and the 235
ulno-trichetral etiologic abutment syndrome correction. So, 236
we recommend associating, each time if possible, both sur- 237
geries. Indeed, our clinical results after wafer procedure are 238
very encouraging with a very low morbidity and no cum- 239
bersome after effects. We do not recommend managing the 240
TFCC 2C or 2D lesions alone. 241

For the sub-acute lunotrichetral instability, the percuta- 242
neous pinning under arthroscopy is a good solution. It can 243
be done after 3 months of natural history with good results. 244
Luno trichetral ligament healing seems to be possible late 245
in the natural history of the ligament injury. 246

For sub-acute scapholunate instability early pinning 247
under arthroscopy is also a good solution but the surgery 248
must be done within 2 months. After this deadline, ligament 249
healing is not possible which necessitates a substitutive 250

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251 treatment. The screwing under arthroscopy is, in our opinion, not a good solution. The intra carpal biomechanic rules bans the undertaking of a single rotation axis between the scaphoid and the lunate. We think that this kind of management would necessitate the creation of a composite rubber screw to allow the complex mobility between these two bones. The classic surgical management of the scapholunate chronic ligament injury is also difficult and hardly discussed [1].

260 The styloidectomy is a really simple and efficient procedure that can be performed easily under arthroscopy. This is a symptomatic treatment of the radio-scaphoidal overlapping. Famous many years ago for the treatment of post traumatic arthritis of the wrist (SLAC, SNAC wrist), this procedure has been progressively abandoned. The miniaturization of the wrist's arthroscopical tools allows styloidectomy under arthroscopy. This treatment results in the disappearance of overlapping and protects the surrounding soft tissue. It is a very useful procedure to manage the radio scaphoid post traumatic overlapping.

271 The proximal scaphoid prosthesis is a good simple adjuvant procedure for the very old and unmanageable proximal scaphoid pole non-union. The arthroscopy allows for a perfect adjustment of the implant socket, respects the surrounding soft tissue and prevents post operative stiffness. Post operative wrist stiffness is very frequent in classic procedures, and prevention is very important, especially for prosthetic treatment. With this prospect in mind, the arthroscopic procedure prevents this complication. Moreover, the perfect respect of the surrounding soft tissue is the very best solution to avoid prosthesis dislocation. Because arthroscopy respects the capsule and the surrounding ligaments, we think that this procedure brings a real advantage (ref).

284 Post operative wrist joint stiffness is a real problem for all wrist surgeons. This kind of complication can ruin every classic and perfectly executed surgical treatment. The specific surgical procedure can also lead to stiffness. Because arthroscopy respects the anatomical structure more and causes less intra-articular blood suffusion, post arthroscopic stiffness is rare. Moreover, during the arthroscopic procedure the intra-articular lines are very easy to identify and to resect. It is, however, better to cut these lines with arthroscopic basket forceps in order to then remove them easily with the shaver. The surgery can be very long without this preliminary precaution.

296 Post traumatic midcarpal instability is rare. The management of this problem is not easy because of the difficulty of the diagnosis and the risk of post operative stiffness. The arthroscopic approach allows an intra-articular shrinkage which leads to a capsular shortening. Our experience is in

short to make an inference but this procedure seems to be very useful for the pain with a real negligible morbidity. We must operate several cases to be able to propose an efficient management.

Conclusion

Wrist post traumatic after effects are very frequent and vary greatly. They can affect every kind of patient young, old, male and female. Most of the time, classic etiologic treatment is complex or difficult to manage. The arthroscopic procedure allows for a good functional outcome in the majority of the cases. Arthroscopy can help the surgeon to confirm the diagnosis of intraarticular post traumatic disorders with high effectiveness but it also appears as a safe (low death-rate) method of treatment. The indications of arthroscopic management of this kind of lesion will probably increase in the future.

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