

## Our Operative Approach to the Elbow Joint

N. Gschwend

Orthopädische Klinik Wilhelm Schulthess, Neumünsterallee 3, CH-8008 Zürich, Switzerland

**Summary.** Several surgical approaches to the elbow joint have been described. The disadvantage of all is an insufficient view of a single incision to the anterior and posterior as well as the ulnar aspect of the joint. They require therefore an additional incision or the resection of the radial head with a detachment of the radial collateral ligament. Our single incision allows for an extensive view to the anterior and posterior aspect of the elbow joint without resection of the radial head and the sacrificing of the radial collateral ligaments. It makes in most instances an additional ulnar incision unnecessary. This incision has mainly been tested for subtotal elbow synovectomy in rheumatoid arthritis, for the mobilization of posttraumatic stiff elbows and the removal of loose bodies as in chondromatosis.

### Introduction

The literature concerning the elbow joint shows that there is a relatively large number of different surgical approaches (posterior, posterolateral (Campbell; Boyd), lateral, lateral “J” (Kocher), medial (Molesworth; Campbell), medial with severance of the epicondyle, medial and lateral, anterolateral (Henry), posterior “U” (MacAusland; Straub; Salzer and Schwägerl)).

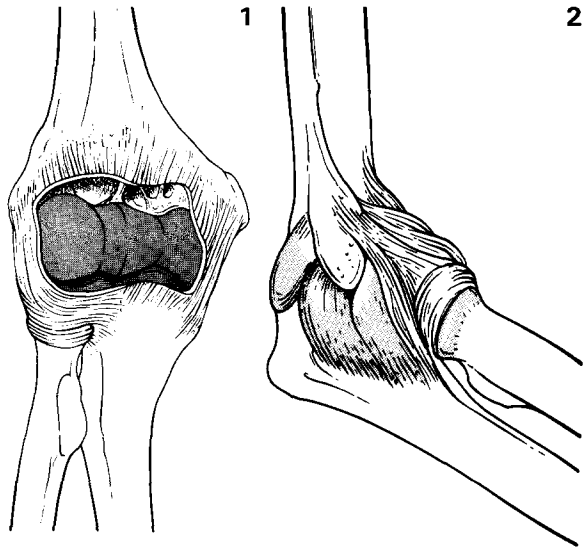
Nevertheless, none of these incisions permit the ventral and dorsal region to be exposed simultaneously and clearly, without having to detach the collateral ligaments extensively or to resect the radial head.

Our frequent engagement with the polyarthritic elbow joint and, in particular, the desire for total synovectomy wherever possible—with retention of the radial head if it was too severely damaged—led us to the following solution some two years ago. Up to that time, we had used—to our moderate satisfaction—the radial

or combined radial and ulnar, and the dorso-radial approach with radial head resection and extensive detachment of the radial ligament system. The following anatomical considerations induced us to introduce a new radio-dorsal approach.

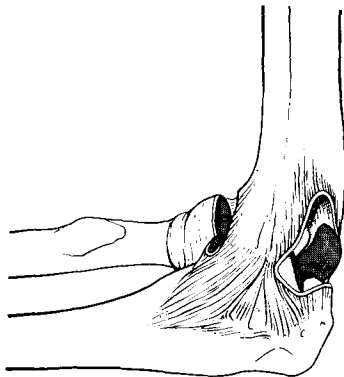
The major part of the synovial tissue is located ventrally in a single space, which is easily visible in flexion (Fig. 1), and furthermore—radiodorsally, as can be seen in Fig. 2. Here early diagnosis of synovitis is usually made by means of palpation. On the other hand, the synovial space is reduced ulnarly, because the bone is covered by a taut ligament system on all sides (Fig. 3). On the radial side, the most important part of the ligament system is located radio-ventrally, to be more precise under the origins of the *Mm. extensor digitorum* and *extensor carpi ulnaris* (Fig. 4).

Hence, it results that detachment of the origin of the *extensor carpi radialis brevis* and penetration on the front margin of the *extensor digitorum* with the elbow flexed (i.e. relaxed flexors) permits an adequate view of the ventral articular region. Detachment of the *M. anconaeus* and penetration on the dorsal margin of the *extensor carpi ulnaris*, however, ensures a good view of the dorsal joint region when the elbow is extended, without our having to detach the major part of the ligament system or to resect the radial head (Figs. 4–7). The following therapeutical measures may be undertaken without difficulty: removal of osteophytes on the *processus coronoides* or on the olecranon to eliminate handicaps to flexion and extension, the removal of loose bodies, detachment of the articular capsule or the insertion of the *M. brachialis* in case of flexion contractures and finally the sub-total synovectomy. In the event of more severe destruction of the radial head and disturbed congruency radio-humerally with subluxation, the radial head can be resected sparingly without difficulty with an alloarthroplastic replacement.



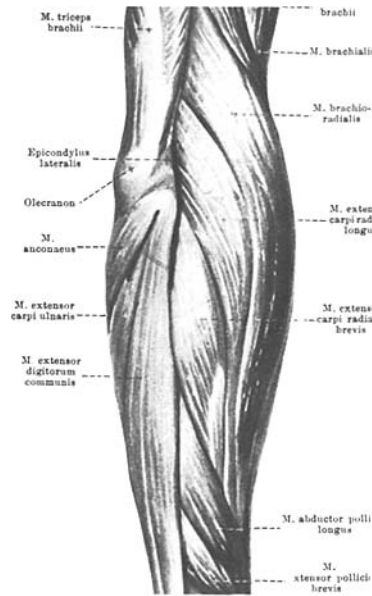
**Fig. 1.** The single ventral articular space—bounded laterally by the strong collateral ligaments—can be seen quite easily from the radial side when the elbow is flexed

**Fig. 2.** The synovial mass easily accessible to the palpating finger and also the surgeon is located radio-dorsally between the olecranon and the main part of the radial collateral ligament



**Fig. 3.** The narrow articular space on the ulnar side of the elbow joint is covered by a fanlike ligamentous system which snugly covers all round the bone. Little synovial tissue is to be expected here

The *operative technique* is shown in Figs. 5–7. The operation is performed in the supine position. It is advisable to lay the arm to be operated on a short arm splint. Furthermore, it should be covered and freely movable so that it can be rotated in the shoulder without exercising force. The incision (Fig. 5) commences about 4–5 cm distally from the radial head, continuing along the radial head (not too ventrally, otherwise it will result in ugly scars) to the radial epicondyle and from there to within 2 cm proximally of the tip of the olecranon. The fascia is split in the



**Fig. 4.** The origins of the Mm. extensor carpi ulnaris and extensor digitorum cover the main part of the radial collateral ligament (see also Figs. 6 and 7)

direction of the main incision. The loose radial muscle fibres of the triceps are mobilized proximally and drawn dorsally, the anconaeus muscle—which is closely related to and often continuous with the triceps—is detached from its origin and held away below. On the epicondyle, we detach the origin of the M. extensor carpi radialis brevis and the distal part of the origin of the M. extensor carpi radialis longus. The incision is continued distally on the anterior margin of the M. extensor digitorum and on the posterior margin of the M. extensor carpi ulnaris to within 4–5 cm distally of the radial epicondyle (Figs. 6 and 7). The fact that we have left the origins of these two muscles on the radial epicondyle means that we have retained the most important point of attachment for the collateral ligaments. With the elbow flexed, a Langenbeck hook is then inserted to provide us with a good view of the entire ventral joint region and to enable the synovial sack to be detached in toto from the humerus. We can observe the ulnar, radio-ulnar and also the anterior radial joint compartement. It is also possible to remove the major part of the synovial sheet in front of and behind the sulcus n. ulnaris, to excise an arthrotic coronoid process and, by rotating the forearm and partial detachment of the mostly overextended anular ligament—likewise without radial head resection—to remove the synovial sack which is particularly involved here. A not less larger synovial sack is located dorsally of the M. extensor carpi ulnaris and in the fossa olecrani. This can also be removed completely and without difficulty when the elbow is extended. In more

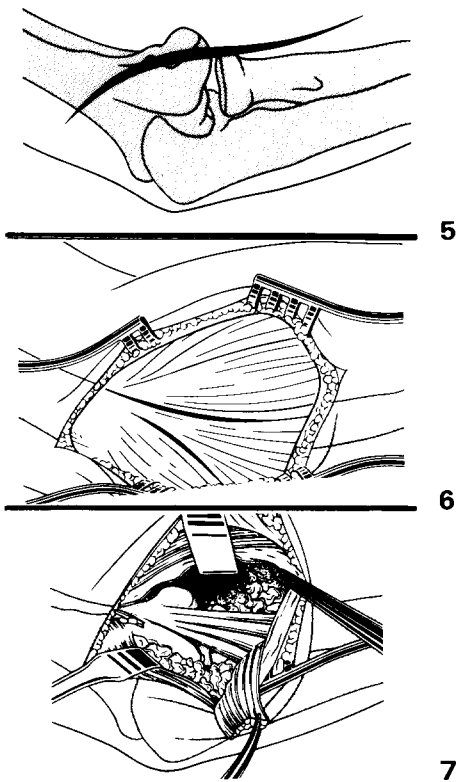


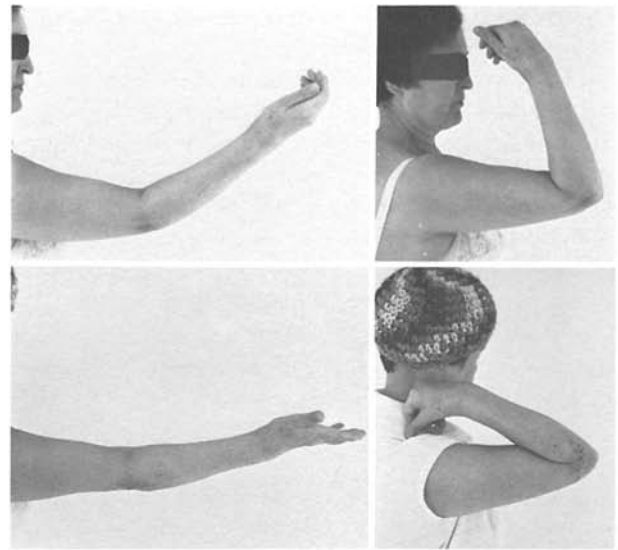
Fig. 5. Radio-dorsal skin incision

Fig. 6. Incision on the ventral margin of the M. extensor digitorum and the dorsal margin of the M. extensor carpi ulnaris. The main part of the radial collateral ligament is located under these muscle origins

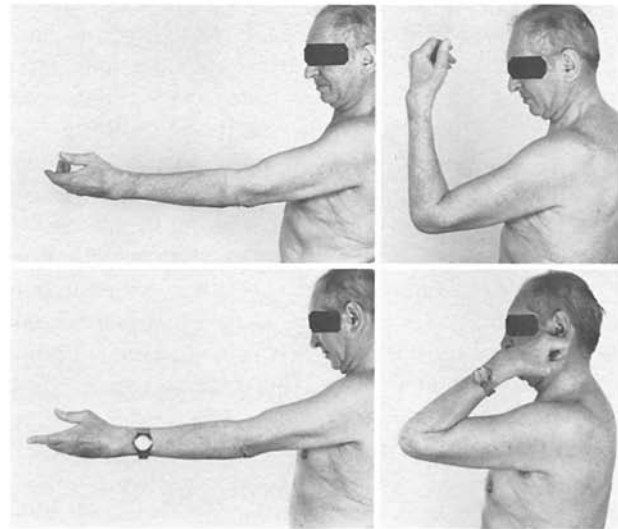
Fig. 7. Detachment of the M. anconaeus and subsequent extension exposes the dorsal articular space. In flexion we have a good view of the ventral articular space. Only a small ulnar compartment lying under the ulnar collateral ligament remains obscured

advanced cases, removal of the olecranon tip will help to improve any existing deficiency in extension. Furthermore, we can clean the exposed cartilaginous margin of the humero-ulnar and radiohumeral joint from this incision. If there are signs of compression of the ulnar nerve, a small incision in the sulcus n. ulnaris is sufficient. The nerve can be transposed subcutaneously or intramuscularly. By means of an incision in the bottom of the sulcus, we can eliminate the synovial portions—which mostly only take up a small amount of space here because of the low elasticity of the covering collateral ligament—and also clean up the cartilage-bone margin.

Resection of the radial head is only indicated where there is a tendency towards subluxation (pre-operative lateral X-ray of the elbow joint with active flexion against resistance), or incongruity of the articular surfaces and advanced destruction of the cartilage. In such cases we resect sparingly and use silastic pros-



8



9

Figs. 8, 9. These illustrations show two patients who underwent a late synovectomy with already advanced cartilage damage and numerous erosions. The ligaments were fairly good and there was no evidence of subluxation. Above: the preoperative, below: the postoperative condition

theses of the Swanson type, since we consider it a matter of importance to distribute the load as uniformly as possible over the humero-radial and ulnar joint region. We have not received any reports on whether equivalent results have been attained with the isoelastic prostheses from Mathys or the available metal prostheses.

In particular with previous subluxation of the radial head, it is obvious that the anular ligament has

to be sutured carefully over the prosthesis, or if necessary reconstructed.

Following extensive irrigation of the wound. The detached muscles are re-inserted and the wound closed after insertion of a redon drain. With the elbow positioned at right angles, it is then immobilized for a period of five days in a plaster splint. After this, it is remobilized with assisted active exercises. It is astonishing how quickly movement increases. Mobilization under general anaesthesia has not been necessary so far. However, we would advocate same if the total range of movement has not reached or even surpassed that obtained preoperatively after a period of 14 days.

### Indications

In the first place, we have performed elbow synovectomies in cases of polyarthritis with this incision. The major advantage lies in the possibility of removing the synovial tissue more or less completely without having to resect the radial head, which is very frequently in a well-preserved condition, or to separate the main parts of the collateral ligaments. Furthermore, the good view of the ulnar joint portion (both ventrally and dorsally) releases us from the necessity of an additional ulnar incision. On the basis of experience gained so far, we can still synovectomize in the described manner even in the presence of ulnar nerve irritation and only in cases where such irritation phenomenon do not disappear within the first post-operative weeks or when—as a result of the X-rays—we can justifiably assume a mechanical cause (bony spurs, osteophytes, erosive changes), do we have to resort to the exposure and, if necessary, transposition of the ulnar nerve.

The relative frequency of ulnar nerve symptoms—that are still present postoperatively or occur anew—like those reported on by many advocates of an ulnar incision, allows us to assume that opening of the sulcus n. ulnaris with mobilization of the nerve becomes rather injurious when the compression is effected solely by synovial lifting of the sulcus bottom, without any anatomical change in the sliding layer of the sulcus.

We reported recently on the results obtained with elbow synovectomy (Gschwend). Under the first ten patients operated in such a manner (nearly all of them were late synovectomies), a marked improvement was found with regard to pain in 9 patients, particularly as well with regard to the range of mobility, which increased by 23° on average. The only deterioration occurred in one case where the synovectomy was performed too late. In this particular case, we can speak of an actually erroneous indication. Figures 8

and 9 show two typical cases of late synovectomy with a decisive improvement in the range of mobility.

The same incision is also very suitable for all joint revisions in posttraumatic conditions with secondary osteoarthritis and capsular shrinkage. An extensive detachment of the joint capsule, the removal of osteophytes on the olecranon and on the coronoid process, detachment of the origins of contracted muscles, e.g. the M. brachialis, can all be carried out without difficulty from the described incision. Accordingly, with the correct indication, a significant improvement in mobility can be realized in most cases.

Likewise, this incision facilitates the extensive search for loose bodies in the joint, as in the case of a joint chondromatosis, where a partial excision of the joint capsule has to be performed simultaneously.

Apart from elbow arthroplasty and the operative treatment of supracondylar pseudarthroses, the reported incision is used the most frequently for our orthopedic spectrum. To sum up, we believe that with this approach to the elbow joint we have improved the results of many an operation.

### References

- Boyd HB (1940) Surgical exposure of the ulna and proximal third of the radius through one incision. *Surg Gynecol Obstet* 71:86
- Campbell WC (1932) Incision for exposure of the elbow joint. *Am J Surg* 15:65
- Gschwend N (1977) Synovektomie des Ellbogengelenks. In: *Die operative Behandlung der chronischen Polyarthritis*. 2. Aufl. Thieme, Stuttgart
- Gschwend N (1981) Die Ellbogensynovektomie: Operationstechnik und Ergebnisse. *Aktuelle Rheumat* 25:168
- Henry AK (1945) Extensive exposure applied to limb surgery. E. a. S. Livingstone, Edinburgh; Williams and Wilkins Co., Baltimore
- Kocher Th (1911) *Textbook of operative surgery*. 3rd English ed. Adam and Charles Black, London
- MacAusland WR (1950) Arthroplasty of the elbow. *Orthopaedic Correspondence Club Letter*
- Mathys R (1975) Zit. von Müller W: Bisherige Erfahrungen mit isoelastischen Prothesen an der oberen Extremität. *Z Orthop* 113:457
- Molesworth WHL (1930) Operation for complete exposure of the elbow joint. *Br J Surg* 18:1303
- Salzer W, Schwägerl W (1970) Die chirurgische Behandlung des Ellbogengelenkes bei der progredient chronischen Polyarthritis. *Arch Orthop Unfall-Chir* 68:127
- Straub LR (1971) In: Inglis AE, Ranawat CS, Straub LR (eds) Synovectomy and debridement of the elbow in rheumatoid arthritis. *J Bone Jt Surg* 52-A:652