FROM THE ORTHOPAEDIC CLINIC OF LUND, SWEDEN. HEAD: PROFESSOR G. WIBERG, AND THE SURGICAL CLINIC OF MALMÖ, SWEDEN. HEAD: PROFESSOR H. B. WULFF.

OPERATIVE TREATMENT OF FRACTURES OF THE HEAD AND NECK OF THE RADIUS

BY

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Fractures of the upper end of the radius are more common than has been previously thought, and their treatment has frequently given unsatisfactory results, with persistent trouble in the form of pain and restricted movement, which sometimes cause considerable disability. The abundant literature published during the last 20 years shows general agreement as to certain principles of treatment, especially on the question of conservative versus operative treatment, but there are still varying opinions as regards the selection of the type of operation for the different fractures. Papers dealing with this rarely quote more than a few cases as examples of each method, and, with a few exceptions, it has not been possible to make any real comparison between the different methods of operation on a reasonably large number of cases. As I have had the opportunity of examining a rather large number of fractures of the head and neck of the radius treated by operation, I feel justified in publishing the results.

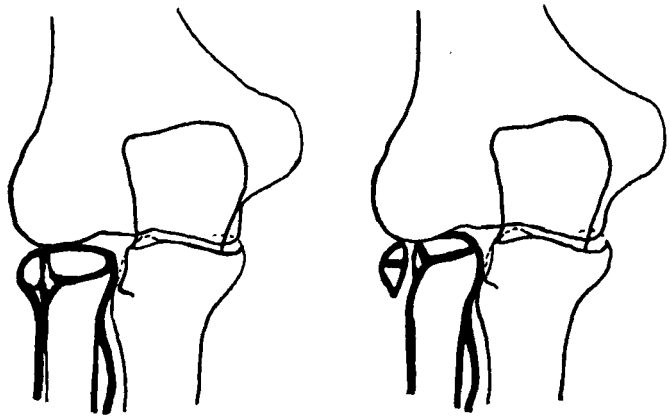
Types of Fractures:

The head of the radius is a rather thin disc, 3-5 mm. thick, and is supported by the cylindrical neck, 1.5-2.5 cm. long, which ends distally at the tuberosity of the radius. A fracture may involve only the head, but it usually extends to the neck as well. Fractures of the neck of the radius are most common in children and young people, and the two main types are

the oblique and the so-called greenstick fractures. Many different groupings of the types of fractures have been put forward, but the majority can fit into the scheme suggested by *Speed*.

I. Incomplete fractures, fissures, cracks.
II. Complete fractures
  (a) Partial, marginal fractures, with displacement of one or more fragments.
  (b) Total fractures, including comminution or crushing of the head.
  (c) Fractures of the neck.

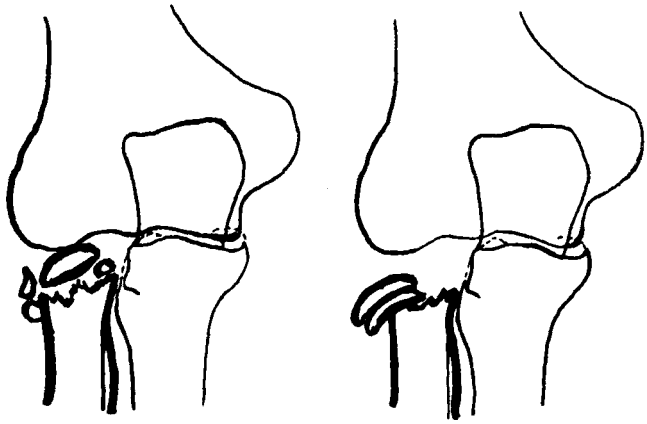
I have followed this grouping, with only slight modifications, necessitated by, among other things, the restriction of the material available to fractures treated by operation. Fractures without any displacement have, of course, not been treated by operation, and are, therefore, not dealt with here. The grouping has been based on the descriptions of the fractures in the operation reports and on examination of the radiographs. The cases have been divided into the following groups:



Type I. *Type II.*

Type I. Marginal fractures with depression or very slight displacement. Material available in this group is very scarce, as these fractures are usually treated conservatively.

Type II. Marginal fractures with greater displacement. As in the preceding group, the fracture-line often extends vertically into the neck. There is usually only one displaced fragment, but this may sometimes be splintered into smaller fragments. The displaced part may lie at an angle, or it may be rotated in relation to the rest of the head, or it may be completely displaced, lying free in the joint cavity, or even forced outside it. The fragment usually carries less than one third of the articular surface, though an even bigger piece can be displaced.



Type III. *Type IV.*

Type III. Comminuted fractures. In this group, the head is splintered into a number of fragments, which may be considerably displaced. The articular surface often shows stellate fissures and is separated from the neck, but in some cases part of the articular surface is intact.

Type IV. Fractures of the neck. Both marginal and comminuted fractures often involve the neck, but they have not been included in this group, which deals with fractures involving only the neck, where there is either an oblique or an irregular transverse fracture, and the articular surface is intact. A considerable proportion of these fractures is made up of the so-called greenstick fractures in children. The fractures may

be intra- or extra-capsular, or both. From a therapeutic point of view, *Hitzrot* included only the extra-capsular fractures in this group, but sufficient reason for this limitation is lacking. These fractures are sometimes combined with partial displacements of the epiphysis. Isolated displacement of the epiphysis is very rare, and has not been observed in this material.

MATERIAL

During the 20-year period—1928-1947—95 cases of fresh fractures of the head and neck of the radius have been treated surgically at the Orthopaedic and Surgical Clinics of Lund and Malmö. Re-examination has been possible in 81 of these cases (85.3 per cent.). Of the remaining 14 patients, 4 have died and 10 have either not been traced or live too far away.

By "fresh fractures" is understood cases which have been operated upon within the first month after injury. As a rule, the operation has been performed within an average of 6 days of the injury. The period of observation varies from 2 to 20 years, with an average of 8 years. The age groups of the 81 cases in which re-examination was possible is given in the following table:

Age Groups.

< 10	10-20	20-30	30-40	40-50	50-60	60-70	> 70
1	11	14	12	17	20	4	2

Age-Grouping of the Types of Fractures.

	No.	Percentage	Average Age
Marginal fracture with slight displacement	5	6	37 years
Marginal fractures with marked displacement	25	31	46 „
Comminuted fractures	34	42	42 „
Fractures of the neck	17	21	23 „
Total	81	100	

SEX INCIDENCE

Of the 81 patients, 62 (77 per cent.) are females and 19 (23 per cent.) males. Of the total 95 fractures the proportions were 75 per cent. and 25 per cent. respectively.

FRACTURES COMBINED WITH OTHER LESIONS

A fracture of the head or neck of the radius is as a rule not an isolated injury, but occurs simultaneously with injuries to the bone, capsule and soft tissue in and around the elbow. In 18 cases a dislocation was found when the patients were admitted to hospital, but it can be reasonably supposed that dislocation occurred in a greater number of the cases but had been spontaneously reduced, because, in many instances, besides a fracture of the head of the radius, there was an isolated displacement of the coronoid process; this must have been produced by a momentary luxation or sub-luxation, as demonstrated by *Odelberg-Johnson* on corpses. *Hein* concluded from the material at his disposal that "the dislocations of the elbow were of sufficient frequency to be considered a likely complication of all fractures of the head of the radius".

A study of the radiographs taken at the follow-up examinations shows, in nearly all cases, changes which suggest the avulsion of small bone fragments, especially at the capsular attachments, and calcifications of the capsule. If the head of the radius has been damaged to such an extent that it requires surgical treatment, the case is not likely to be uncomplicated. I have therefore included in the same group all the cases described in the notes and reports on operations as being uncomplicated, and all the cases which showed dislocation fractures of the coronoid process and other minor injuries. I have excluded cases of fracture of the head of the radius where this fracture was only of minor importance in comparison with the other bone injuries as, for example comminuted fractures of the upper end of the ulna. Similarly, I have excluded other bone injuries caused by violent force and which have required special therapy, which might considerably influence the final

results. For this reason, 7 of the 81 cases have not been included in the analysis of the final results, and only 74 therefore remain. As the intention is to compare the final results of different fracture types and methods of operation, the grouping mentioned above has little effect on the results, since the diagnosed minor complications occur to about the same extent in the different groups.

TREATMENT

The surgical methods used in this material and discussed here, are:

1) Open reduction.
2) Partial excision, and
3) Total excision of the head of the radius.

The choice of operative method is partly dependent on the type of fracture; thus one can hardly reduce a comminuted fracture and sometimes, with severe crushing of the head, mere partial excision of fragments is not sufficient. In other cases of comminuted fractures, however, one can choose between removing displaced fragments and leaving that part of the articular surface which remains connected to the neck; or one can make a total excision of the head. The same applies to marginal fractures with displacement, but in these cases, open reduction is sometimes possible. Finally, for fractures of the neck it is possible to perform either an open reduction or a total excision of the head.

OPEN REDUCTION

This is generally considered to be the best treatment for fractures of the neck, especially in young patients where a closed reduction has been unsuccessful (*Pfab, Key, Madlener* and *Wienert, Hertel Oppolzer, Murray, Roosvall*). In this material, open reduction was performed in 10 cases, for both fractures of the neck and marginal fractures with depression or slight displacement. Neither fixation of the fragment or the head, as recommended by *Sprengell and others*, nor replace-

ment of a splintered head by a vitallium cup, as described by *Speed,* has been attempted.

Partial excision is recommended as the best method, whenever possible, by *Lassen, Buxton, Hertel, Siebner,* whereas others stipulate that it is inadvisable where it involves the removal of more than one-third of the head (*Wilson, Jones, Eliason* and *North*). In the present series fragments were removed in 33 cases, and in approximately 50 per cent. less than two-thirds of the joint surface was left.

Excision of The head: Opinion is strongly divided as regards the results of this operation. *Hitzrot, Speed, Pfab, Bohrer, Wilson, Jones, Murray, Watson-Jones, Meekison, Jacobs* and *Kernodle* have obtained satisfactory results and prefer this method, even where removal of fragments would be possible. Other authors report less successful results and warn against the method, especially in regard to the secondary complications of cubitus valgus and wrist complications (*Thomsen, Lewis* and *Thibodean, Cubbins—Callahan—Scuderi, King, Lang*). To prevent excessive new bone formation from the neck, and the consequent risk of synostosis and restricted movement after total excision of the head, different techniques have been suggested, e.g. to cover the end of the neck with fascia, with a fat transplant, or with a capsular flap. In order to obtain as free movement as possible and to reduce the risk of excessive callus formation, *Hitzrot, Speed* and *Sever* recommend total excision to include the neck down to the tuberosity, whereas others, e.g. *Thomsen,* advise removal of as little as possible of the neck, to avoid the risk of wrist complications. *Bergk,* on the other hand, attaches no importance to the size of the part removed. In this material, where excision of the head was performed in 31 cases, no special effort was made to cover the end of the neck, although in a few cases the olecranon bursa used as a covering, and in some the marrow cavity of the neck was scraped out. In order to be able to estimate the late results in these cases, I have tried to differentiate between excision of the head alone, and a more radical removal of the head and neck. I have

based this differentiation on the reports of the operations and examination of the radiographs.

OPERATIVE TECHNIQUE

In this material lateral longitudinal inscisions, often of Kocher's type, were mostly used. The annular ligament was usually divided, and either left free or sutured. Radiographs taken after operation sometimes showed that small fragments had been left behind, both in cases where fragments had been removed and in those, where a resection of the capitulum had performed.

Plaster slabs or plaster casts were applied and left for 2-3 weeks, after which physio-therapy was instituted for varying periods of time.

RE-EXAMINATION

I have personally examined the re-examined patients. All were asked about pain and their ability to work. Restricted movement of the elbow and wrist, muscular atrophy, deformities and crepitations were recorded, the strength of the hand was measured, and radiographs were taken of both elbows and both wrists.

CRITERIA FOR ASSESSMENT

The patients have been classified in 3 groups, according to their symptoms:

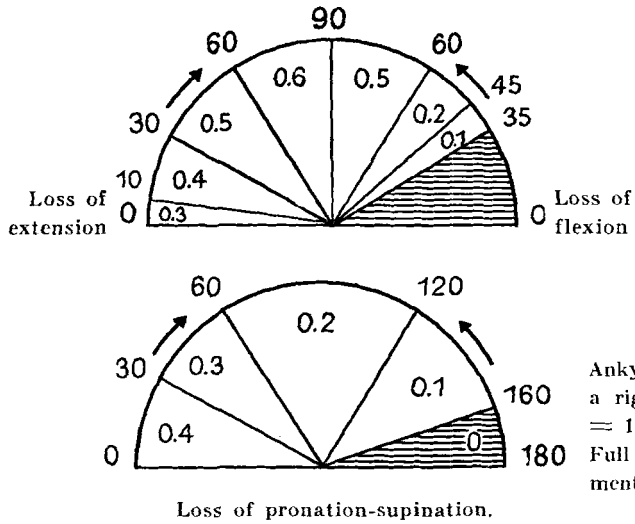
A. Symptom-free

B. With mild symptoms

C. With more severe symptoms and disability.

The complaints do not correspond to the objective changes, such as restricted movements, deformity and changes demonstrable on the radiographs. The restriction of the different movements of the elbow varied considerably, and it is extremely difficult to compare the result in one patient who has considerably reduced extension, with that in another who has severely reduced pronation and supination, but full ex-

tension. In order to form a basis for comparison of the different reductions of movement, I have tried to assess them according to the system compiled by *Ferguson* and *Howorth,* and further developed by *Gade,* in regard to the hip joint. Thus, the severity of the restriction is assessed according to not only the different planes, but also the position in these planes. The range of movement is expressed in degrees in different sectors and, in order to obtain conformity, these degrees are multiplied by different coefficients. This evaluation is, however, quite subjective and the scheme only obtains for the cases under discussion, and not for the elbow in general, because, amongst other things, I have not considered a loss of flexion greater than 90°, as no such case was encountered in this material.



Loss of pronation-supination.

The limitations of movement have been assessed by this system, and the cases have accordingly been divided into the following groups:

0 — 5 = a
5.5 — 10 = b
10.5 — 20 = c
20.5 — 100 = d

This grouping has then been combined with the grouping according to the subjective complaints, giving the following 4 groups:

perfect	good		fair		poor	
Aa	Ab	Ac	Ad		Bd	Cb
	Ba	Bb	Bc	Bd	Cc	Cd

RESULT

The results of the treatment of fractures of the head of the radius agree with *S. Jones'* statement that: "The prognosis is good for recovery of a useful elbow, rarely is it a normal elbow".

Based on the assessments already given, the following results are obtained in relation to the types fractures:

	Marginal Fracture		Comminuted Fracture		Fracture of the Neck		Total	
	Cases	%	Cases	%	Cases	%	Cases	%
Subjective:								
A. Symptom-free	14	54	7	21	3	20	24	32
B. Mild symptoms	10	38	21	64	11	73	42	57
C. More severe symptoms	2	8	5	15	1	7	8	11
Subjective + objective:								
Perfect	9	35	2	6	3	20	14	19
Good	5	19	16	49	4	27	25	34
Fair	8	31	9	27	3	20	20	27
Poor	4	15	6	18	5	33	15	20
Total	26		33		15		74	

As may be expected, this shows that marginal fractures, which represent the least severe type, form the majority of the fractures in the "Perfect" group. The different types in the group "Poor" are fairly evenly represented, with a slight preponderance of fractures of the neck, but here the use of what is now considered an unsatisfactory method of operation may have played an important role, as is shown in the follow-

ing table. This table also shows that the severity of the fracture is important, because from amongst the marginal fractures a group with only slight displacement, which shows considerably better results, can be regreated.

	Marginal fractures		
	With slight displacement	With marked displacement	
		fragment $< 1/3$	fragment $> 1/3$
Perfect	4	3	2
Good	1	2	2
Fair		5	3
Poor		3	1

The marginal fractures with serious displacement have been subdivided into two groups according to the size of the fragment. It is often said that two-thirds of the articular surface should be intact for it to be advisable to perform partial excision, but the results in the present material do not support this theory.

RESULTS OF DIFFERENT METHODS OF OPERATION

In the following table the cases are grouped in accordance with the method of operation and irrespective of the type of fracture:

The Results in Relation to the Type of Operation. All Cases.

	Partial excision		Total excision		Open reduction	
	No.	%	No.	%	No.	%
Perfect	7	21	1	3	6	60
Good	10	30	13	42	2	20
Fair	10	30	9	29	1	10
Poor	6	18	8	26	1	10
Total	33		31		10	

As already mentioned, these figures are not quite com-

parable, on account of the influence the type of fracture will have on the results, and the methods of operation should, therefore, be compared within the fracture groups. In this material, total excision of the head has not been used for marginal fractures, and the only group where the results of partial and total excision can be compared are the comminuted fractures, but even here a certain selection was made, as partial excision was only used if some part of the head was uninjured. On the other hand, it should be mentioned that in this group a bigger portion of the head and its joint surface was removed than is usual in cases of partial excision.

The Results of Operations for Comminuted Fractures.

	Partial Excision	Total Excision
Perfect	1	1
Good	6	10
Fair	2	7
Poor	2	4

If the relatively similar groups, marginal fractures with considerable displacements are added to the comminuted fractures, the following figures are obtained:

The Results for Marginal Fractures with Considerable Displacement and for Comminuted Fractures Combined.

	Partial Excision	Total Excision
Perfect	6	1
Good	10	10
Fair	10	7
Poor	6	4

This table does not show that any particular method of operation is superior, in contradiction to *Murray* who states a preference for total excision over partial excision.

The results of partial excision and open reduction can be compared for the marginal fractures, where open reduction was performed on 4 cases with only slight displacement.

The Results of Marginal Fractures Treated by Partial Excision and by Open Reduction.

	Partial Excision	Open Reduction
Perfect	6	3
Good	4	1
Fair	8	
Poor	4	

The cases where open reduction was used belong to a group not usually treated surgically, but notably good results were obtained in this group.

For fractures of the neck total excision was performed in 9 cases and open reduction in 6:

The Results of Operations for Fractures of the Neck of the Radius.

	Total Excision	Open Reduction
Perfect	—	3
Good	3	1
Fair	2	1
Poor	4	1

The results for fractures of the neck which are generally regarded as most satisfactory after open reduction, are shown clearly in the above table.

If the comminuted fractures are grouped according to the extent of the total excision, the following difference in the results is obtained:

Total Excision.

	Excision of head	Excision of head + neck
Perfect	—	1
Good	5	5
Fair	6	1
Poor	3	1

The above figures seem to advocate removal of the head sufficiently far down in the neck. Although this increases the

risk of cubitus valgus and upward displacement of the radius, with a consequent faulty position of the wrist, the complaints are not sufficient to outweigh the advantages obtained.

It might be of interest to compare the different methods of operation in relation to the nature of the resulting restriction of movement. *Bohrer* states that, following surgical treatment of a fracture of the head, extension-flexion was usually only slightly restricted, but there was considerable loss of rotation, or even synostosis between the radius and ulna, in 50 per cent. of his cases. *Baumann*, on the other hand, reports that rotation is rarely reduced after removal of a fragment, though limitation of extension and flexion is very frequent, whereas *Pfab* disagrees; *Speed* considers that total excision of the head is necessary to avoid limitations of rotation.

Average Figures for Limitations of Movement after Different Types of Operation.

	No. of cases	Loss of Extension	No. of cases with full extn.	Loss of flexion	No. of cases with full flexion	Pronation-Supination		No. of cases with full pronation-sup'nation
						Loss compared with sound side	Range of Movement	
Removal of fragments	33	15°	14	6°	15	42°	114°	3
Total excision	31	17°	10	7°	11	41°	110°	5
Open reduction	10	2°	9	6°	5	31°	125°	4
Total	74		33		31			12

If the same calculation is made for only one type of fracture, the following figures are obtained:

Marginal Fractures.

	No. of cases	Loss of Extension	Loss of Flexion	Pronation-supination	
				Loss compared with sound side	Range of Movement
Removal of fragments	22	16°	6°	44°	112°
Open reduction	4	—	4°	—	158°
Total	26				

Comminuted Fractures.

	No. of cases	Loss of Extension	Loss of Flexion	Pronation-supination	
				Loss compared with sound side	Range of Movement
Removal of fragments	11	12°	8°	36°	117°
Total excision	22	16°	7°	38°	113°
Total	33				

Fractures of the Neck.

	No. of cases	Loss of Extension	Loss of Flexion	Pronation-supination	
				Loss compared with sound side	Range of Movement
Total excision	9	18°	9°	48°	101°
Open reduction	6	3°	8°	52°	102°
Total	15				

These figures confirm what has been said before about the advisability of open reduction for fractures of the neck, and whenever possible, perhaps, also for marginal fractures, but they do not show any definite difference between the results of removal of fragments and of total excision, and they do not tell us anything about the different functions of the joint.

Wrist trouble has been complained of by 5 out of the 74 patients, following surgical treatment of fractures of the head; total excision had been performed in 4 of them. A more serious loss of power in the affected hand was found in 25 of the 69 cases[1].

There was an increase in the carrying angle on the injured side compared with the normal side in 31 of 71 cases; in 20 total excision and in 11 removal of the fragment had been performed. In addition, radiographs of the wrists were exam-

[1] Power was measured with a hand-dynamometer. The power was regarded as considerably reduced when it was the same or less than on the left side in cases of injury to the right side in right-handed patients, and vice versa.

ined and the proximal displacement of the radius on the injured side was measured and compared with the uninjured side. Proximal displacement was observed in 27 out of 35 cases of total excision—it varied between 1 and 7 mm. with an average of 2.5 mm; whereas it was observed in only 4 out of 33 cases with partial excision and open reduction—it ranged from 1-3 mm.

	Total Excision			Partial Excision	Open Reduction
	Radical excision	Conservative excision	Total		
Increase in carrying angle: average	8.1°	5.5°	6.6°	2.5°	—
Proximal displacement of end of radius	2.3 mm.	2.2 mm.	2.3 mm.	0.3 mm.	0.2 mm.

A great number of the cases treated by total excision showed a moderate cubitus valgus, and in nearly all there was also a proximal displacement of the radius, averaging about 2 mm., with a corresponding radial displacement of the hand and prominence of the distal end of the ulna. In spite of these serious anatomical and radiographic changes, symptoms attributable to them were reported in a few cases only. Despite the rather long period of observation, it is still possible that patients with these changes, who at present are symptom-free, may develop complaints in the future. Among the patients who now have complaints, 3 are cases of fractures of the neck in young persons, where the injury took place 7-10 years ago, and 2 where the injury occurred 12-16 years ago.

Radiological Changes:

With a few exceptions, radiographs taken at the time of injury have been available. By comparing these with radiographs taken at re-examination, it has been found, as mentioned previously, that the injury recorded as fracture of the neck of the radius is by no means limited to simple fracture;

in nearly all cases the radiographs taken at re-examination showed involvement of the capsule and surrounding tissue, such as small tears of the capsule attachments, calcification of the capsule and changes of a myositis ossificans-like nature. In a rather large number of cases there were calcifications and bone-formation on the small remaining fragments, while in one or two cases even large fragments had been left.

Widespread calcification of the annular ligament was found in 5 cases and in others there were minor calcifications at the attachments. These do not, however, seem to cause any significant limitation of the movements. Fig. 1 shows calcification of the annular ligament in a case where the fragment, which was only slightly displaced, was reduced.

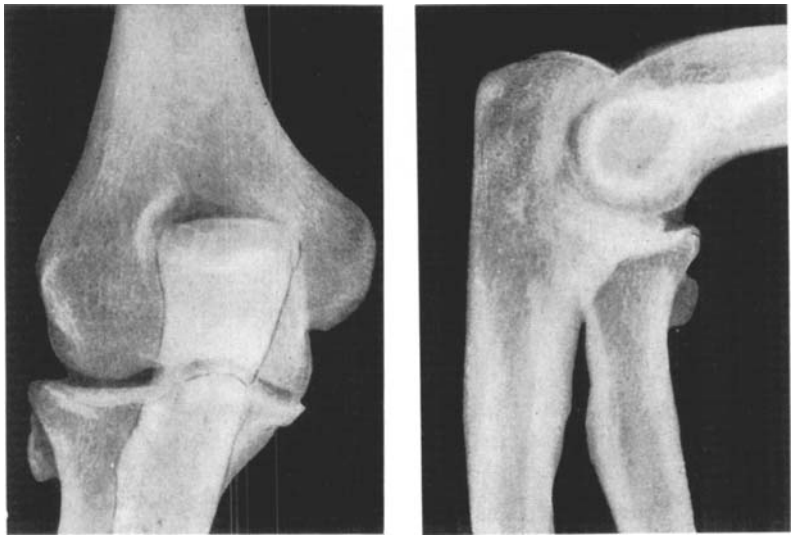


Fig. 1.
J.L.M. aged 34 years. Calcification of the annular ligament.

After removal of fragments, the remaining part of the head is rounded off and replaced, as a rule, by a somewhat clumsy, though quite normally shaped, head.

After total excision certain changes are seen in the neck

area, and their nature has been discussed. Re-establishment of contact between the head of the humerus and the remainder of the radius is generally found. This seems to be brought about partly by a displacement of the radius, which can be registered by measuring the position of the wrist, but the few millimetres which this involves are hardly sufficient by themselves, and it is supposed that a reconstruction of bone takes place, probably by organisation of the haematoma and the ingrowth of osteoblasts from the periosteum and medullary cavity (*Sutro*). That this new bone formation does in fact take place was also confirmed by examining this material, and a typical picture showing a bone formation pointed in a volar-radial direction, as well as a resorption of the neck area in a dorso-ulnar direction, were observed in 11 out of 31 cases of total excision. The real cause of these developments cannot be determined, but it is possible that static conditions play an important part. Fig. 2 shows a typical radius stump immediately after surgical treatment and at re-examination 3 years later. Judging by the distance from and relation to the tuberosity of the radius, this Fig. shows that resorption as well as new bone formation does take place.

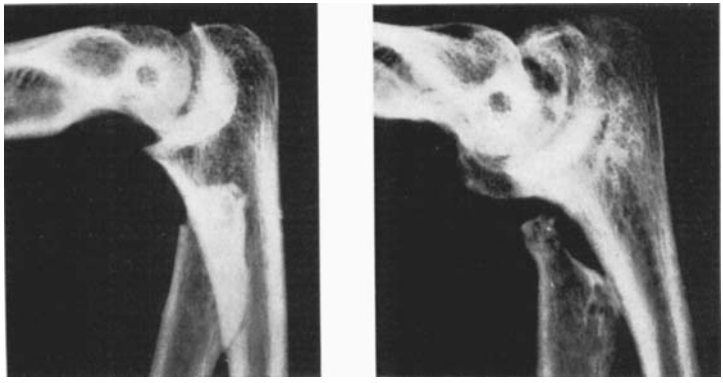


Fig. 2.
S.S. aged 32 years. a. stump of radius after total excision
b. appearance 3 years later.

The excessive new bone formation which *Sutro* describes, and for which he suggests remedies, has not been observed in this material.

In cases of total excision in children and young persons a reshaping of the stump into a more anatomically normal "new head", as has been described by *Sutro* and *Bergk*, can be seen. Fig. 3 shows a fracture in a 10-years' old girl, where the head of the radius was removed and the result compared with the uninjured side 10 years later.

a. b. c.

Fig. 3.

A.G. aged 10 years. a. Fracture of the neck of the radius.
b. 10 years later: "new capitulum".
c. healthy side for comparison.

In cases of fracture of the neck in children, where the head has been reduced, complete recovery—judging by the radiographs—may result, and an example of this is given in Fig. 4.

Arthrosis deformans changes are quite frequently seen on the radiographs, following fractures of the head of the radius. In this material such changes have been observed in 28 out of 69 cases (41 per cent.). The period of observation for the group in which these changes were detectable was, on an average, 9 years, and the average age of the patient was 40 years. The corresponding figures for the group without changes were 7 and 36 years. This suggests the possibility that by

a. b.

c.

Fig. 4.

B.V. aged 8 years. a. Fracture of the neck with considerable displacement.
b. appearance 6 years later.
c. healthy side for comparison.

prolonging the observation period, further instances of arthrosis deformans may develop; the difference is, however, very small and it can be presumed that in many cases of fracture of the head of the radius, such changes do not develop. A significant difference in the incidence of arthrosis deformans has not been demonstrable in the types of fracture or methods of surgical treatment. As mentioned previously, by, for example, *Baumann,* it is remarkable that no correspondence exists between the symptoms and radiologically demonstrable arthrosis deformans; even in cases where this is very pronounced, the patient is invariably symptom-free.

SUMMARY

Seventy-four cases of surgically—treated fresh fractures of the head of the radius were re-examined on an average 8 years after the injury, and the results of treatment have been judged in accordance with the type of fracture and the method of operation.

A fracture of the head of the radius comprises simultaneous injury to the bone, capsule and soft tissue in and around the elbow. Luxation or sub-luxation occur in most cases, but these are often spontaneously reduced.

The prognosis depends mainly on the type of fracture.

In cases of marginal fractures with displacement, and comminuted fractures, where it is possible to choose the method of operation, the results following total excision and removal of the fragment are not appreciably different.

Where total excision is performed, this should include the greater part of the neck as well as the head of the radius.

Following total excision, changes such as cubitus valgus and proximal displacement of the radius, with consequent changes at the wrist, are very frequent, but only in a few cases do they cause symptoms, except where the excision is performed in children.

In cases of marginal fractures with moderate displacement, open reduction, when it is possible, gives satisfactory results, and it should perhaps be used more than formerly.

RESUME

Soixante-quatorze cas de fractures de la tête du radius traitées chirurgicalement pendant qu'elles étaient fraîches ont été réexaminées en moyenne 8 ans après la lésion et les résultats du traitement ont été judgés en se basant sur le type de fracture et la méthode d'opération utilisée.

Une fracture de la tête du radius comporte simultanément la lésion de l'os, de la cupule et des tissus mous qui entourent le coude. Dans la plupart des cas il se produit une luxation ou une sub-luxation, qui disparaissent souvent spontanément.

Le pronostic dépend principalement du type fracture.

Dans les cas de fractures marginales avec déplacement, et de fractures broyées, où il est possible de choisir la méthode opératoire, les résultats suivant l'excision totale et l'extirpation du fragment ne sont pas sensiblement différents.

Lorsque l'excision totale est pratiquée, elle comprend une grande partie du col et de la tête du radius.

A la suite de l'excision totale, des modifications telles que le cubitus valgus et le déplacement proximal du radius, avec les modifications qui s'ensuivent dans le poignet sont très fréquentes, mais ne provoquent des symptômes que dans très peu de cas, excepté lorsque les excisions sont faites chez des enfants.

Dans les cas de fractures marginales avec léger déplacement, une réduction ouverte, lorsqu'elle est possible, donne des résultats satisfaisants et devrait peut-être être pratiquée plus souvent que cela n'a été le cas jusqu'ici.

ZUSAMMENFASSUNG

Vierundsiebzig Fälle von chirurgisch behandelten, frischen Brüchen des Radiusköpfchens wurden im Durchschnitt 8 Jahre nach dem Unfall nachuntersucht und das Resultat wurde entsprechend der Bruchtype und der Operationsmethode beurteilt.

Ein Radiusköpfchenbruch umfasst gleichzeitige Schädigung des Knochens, der Kapsel und der Weichteile im und um das

Ellbogengelenk. Luxation und Subluxation treten in den meisten Fällen aur, aber renken sich meist spontan ein.

Die Prognose hängt zum grössten Teil von der Bruchtype ab.

In Fällen von marginalem Bruch mit Verschiebung und in Splitterbrüchen, wo es möglich ist die Operationsmetode zu wählen, zeigen die Resultate nach Excision und Entfernung des Fragmentes keine wesentliche Verschiedenheit.

Wo die totale Excision ausgeführt wird, sollte sie stets sowohl den grösseren Teil des collum radii als auch des capitulum mit inbegreifen.

Nach der totalen Excision sind Veränderungen, wie cubitus valgus und proximale Verschiebung des Radius mit folgenden Veränderungen des Handgelenkes sehr häufig. Aber nur in wenigen Fällen rufen sie Symptome hervor, ausgenommen jene Fälle in welchen die Excision an Kindern vorgenommen wurde.

In Fällen von marginalen Brüchen mit geringer Verschiebung giebt die offene Reposition, wenn sie ausgeführt werden kann, zufriedenstellende Resultate und sollte vielleicht häufiger angewendet werden.

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