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END RESULTS IN THE TREATMENT OF MONTEGGIA FRACTURES

A Follow-Up Study of Twelve Cases

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Monteggia's fracture, i.e. fracture of the ulna with dislocation of the radial head is fairly rare. The mechanism of the injury is often difficult to reconstruct in detail and has to be ascribed to some unspecified fall, as in bicycle accidents. Frequently, though, a direct force upon the ulna can be discerned and the Monteggia fracture is sometimes regarded as a warding-off injury.

The fracture is most common in children. Thus in *Smith*'s series, for example, 22 of the 25 cases were seen in individuals below 17 years of age. The fracture appears to be equally common on both sides.

From a therapeutic and prognostic point of view it is fundamentally important that two types of the fracture may be distinguished, namely an extension type and a flexion type.

The extension type is characterized by forward dislocation of the head of the radius and forward angulation of the ulnar fracture, while the flexion type shows backward dislocation of the head and the fracture is angulated backwards. The extension type is by far the most common and represents some 85–90 per cent of all Monteggia fractures. The flexion type occurs almost exclusively in adults, in whom it is almost as common as the extension fracture.

As to treatment *Böhler, Evans,* and *Naylor,* for example, recommend closed reduction and claim that the vast majority of both extension and flexion fractures can be reduced by such manipulation. *Smith, Speed, Watson-Jones* and others, however, prefer open reduction, particularly in the treatment of extension fractures. *Watson-Jones,* however, has reported good results of closed reduction of the flexion type of fracture.

No unanimity has been achieved among the advocates of the open

reduction as to whether the radial head should be replaced at once or later. The annular ligament usually ruptures and *Smith, Speed* and others claim that this ligament is most frequently interposed under the head of the radius, thereby preventing reposition. This would make primary intervention the rational method. *Watson-Jones*, on the other hand, stresses the risk of post-traumatic myositis ossificans and therefore rarely interferes with the radial head at an early date, particularly since he has often observed the head to reassume its proper position once the ulna fracture has been correctly reduced. Internal fixation with the aid of plate and screws, Kirschner wire, Küntscher nail, Steinmann pin and recently also a Rush pin is now the rule in the operative management of the extension type of fracture.

The complications making the prognosis of Monteggia fractures doubtful are, above all, recurrent dislocation of the radial head and pseudarthrosis of the ulna.

According to *Watson-Jones* (1940) the prognosis of these fractures is poor. He reported complete recovery without sequelae in only 2 of 34 cases. *Mobley & Janes* (1955) whose series consisted of 17 cases treated mainly by operation, described the results as excellent in 2 and as good in 10. Evans, who is an advocate of closed reduction, reported full range of mobility in 5 out of 8 cases.

As mentioned above, Monteggia fractures are fairly rare. Therefore our knowledge of these fractures can only be based on relatively small personal series. Accordingly it was considered justified to contribute a description of the fresh Monteggia fractures treated at the Departments of Orthopaedics in Lund and Malmö in the years 1946–1959.

The series consisted of 14 cases. One of these patients has, however, meanwhile died and one is still receiving treatment. The remaining 12 were reviewed.

TABLE 1

Age in years	Sex		Type of fracture		Treatment	
	M	F	Extension	Flexion	Closed red.	Open red.
0– 5	–	–	–	–	–	–
6–10	2	0	2	0	2	0
11–15	2	0	2	0	2	0
16–50	3	2	5	0	1	4
> 50	1	2	1	2	0	3
Total	8	4	10	2	5	7

The patients' ages ranged from 6 to 54 years. Three of the fractures were due to direct violence – kick, or blow by part of a machine. Two fractures were complicated. Only 33 per cent of the patients were below 16 years of age. As in most series on record extension fractures were five times as common as the flexion type. In 8 patients primary closed reduction was attempted but failed in 3, who were afterwards subjected to operation.

The operative methods varied somewhat. Intramedullary fixation was done in all 7 cases operated upon (3 with Rush pin, 3 with a Küntscher nail and one with Kirschner wire). The head of the radius was primarily exposed in 3 patients, all adults. In 2 of them the fractures were of the flexion type in which the head of the radius is usually more or less fragmented. The fragments or the entire head were extirpated. In the third patient who had an extension fracture the operator described interposition of the ruptured annular ligament. The ligament was replaced but not sutured.

All of the operations were performed within 6 days of the injury. In addition to the operation for the extraction of the nails or wire, reoperation was necessary in 2 cases and then for excision of the head of the radius. In one of the cases, the one in which the annular ligament ruptured and was found to be interposed, re-dislocation ocurred after 2 weeks, and 7 months after the injury severe loss of the range of rotation made extirpation necessary. In the other case there developed considerable posttraumatic ossification around the radial head, which had, however, not been exposed at the first operation.

The fractures were immobilized in plaster from 5 weeks (in a 6 year old child) to 3½ months (in a case of delayed healing of the ulna fracture) but was usually about 8 to 10 weeks.

In 7 cases the later course was uneventful, while the following complications ocurred in the remaining 5:

pseudarthrosis of ulna	2
delayed healing of ulna	1
myositis ossificans + redislocation of the radial head	1
myositis ossificans + transient radial paresis	1

The cases of pseudarthrosis which were not detected until the review, claimed normal function and denied symptoms. The patients therefore refused operation. The diagnosis was, however, made roentgenologically and clinically no instability was demonstrable.

The results of treatment by the various methods are given in the table below, where the patients are grouped according to type of therapy and to age. In the table, "excellent" is to be understood as freedom of all symptoms and signs, "good" as full working capacity in the same occupation as before but with slight symptoms or slight loss of range of mobility of the elbow, and "satisfactory" as some loss of working capacity and moderate loss of range of mobility. The 2 patients with pseudarthrosis of the ulna were assigned to this group. None of the results were so bad as to be classified as "poor". The shortest interval between the accident and the review was 11 months.

TABLE 2

Treatment	Result		
	Excellent	Good	Satisfactory
open reduction	1	4	2
closed reduction	4	0	1
Age in years			
0– 5	–	–	–
6–10	2	0	0
11–15	1	0	1
16–50	2	3	0
> 50	0	1	2
	5	4	3

The analysis confirms the conclusions made by earlier workers in this field and shows that in children the prognosis is good and that the prospects are bright in cases in which the fracture has been successfully reduced by closed manipulation.

In the present series the ulnar fracture often caused more concern than the dislocation of the radial head. The probably scanty vascularization at the site of predilection of the fracture is thought to be responsible for the tendency to pseudarthrosis which can apparently only be counteracted by gentle operative technique and relatively long immobilization in plaster. The use of intramedullary fixation, particularly with a Rush pin, instead of plates and screws, is undoubtedly a step forward, which is reflected in some measure in the improvement of the prognosis during the last decade.

SUMMARY

The results of conventional treatment of 12 Monteggia fractures in 4 children and 8 adults are described. In the children the fracture was treated successfully with closed reduction, while in 7 of the adults open reduction proved necessary. In all of these 7 some sort of intramedullary fixation was employed and it was found that the Rush pin could be used with advantage. Of the operated patients, 5 have returned to their usual occupation without loss of working capacity and in the remaining 2 working capacity and range of mobility of the elbow are somewhat reduced. The slow healing of the ulna fracture was the greatest problem in the present series.

RESUME

Les résultats du traitement conventionnel de 12 fractures Monteggia chez 4 enfants et 8 adultes sont décrits. Chez les enfants les fractures ont été traitées avec succès par réduction fermée, tandis que chez 7 des adultes il s'est montré nécessaire d'effectuer une réduction ouverte.

Chez tous les sept, on a utilisé une sorte d'enclouage intramédullaire et on a découvert que la broche Rush pouvait être utilisée avantageusement. Parmi les malades opérés, 5 avaient repris leurs occupations habituelles sans perte de capacité de travail et chez les 2 autres la capacité de travail et l'étendue de la mobilité du coude étaient quelque peu réduites. C'est la lente guérison de la fracture du cubitus qui a posé les plus grands problèmes dans la présente série de cas.

ZUSAMMENFASSUNG

Die Ergebnisse der konventionellen Behandlung von 12 Monteggia Brüchen bei 4 Kindern und 8 Erwachsenen werden beschrieben. Die Brüche der Kinder wurden erfolgreich mittels unblutiger Einrichtung behandelt, wärend bei 7 der Erwachsenen die offene Einrichtung vorgenommen werden musste. Bei allen sieben wurde eine Form der intramedullären Nagelung angewendet und man fandt, dass der Rush Nagel mit Vorteil anbewendet werden konnte. Von den operierten Patienten konnten fünf ihre gewöhnliche Beschäftigung ohne Herabsetzung der Arbeitsfähigkeit wiederaufnehmen, während bei den beiden übrigen dit Gebrauchsfähigkeit und der Bewegungsumfang des Ellbogens etwas herabgesetzt sind. Die langsame Heilung des Bruches der Ulna war das grösste Problem in diesen Fällen.

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