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Treatment of clavicular fractures

Figure-of-eight bandage versus a simple sling

Seventy-nine out-patients with midclavicular fractures were included in a prospective, randomized trial comparing treatment with a figure-of-eight bandage and a simple sling. Sixty-one patients completed the study and were reevaluated clinically and radiographically after 3 months.
We found that treatment with a simple sling caused less discomfort and perhaps fewer complications than with the figure-of-eight bandage. The functional and cosmetic results of the two methods of treatment were identical and alignment of the healed fractures was unchanged from the initial displacement.

Kjeld Andersen
Per Østergaard Jensen
Jørgen Lauritzen

Department of Orthopedics, Aarhus Amtssygehus, Aarhus, Denmark

Correspondence: Dr. Andersen, Tage-Hansensgade 23, I.th., DK-8000 Aarhus C., Denmark

The treatment of midclavicular fractures by means of a figure-of-eight bandage demands regular adjustments throughout the period of treatment, and it has often been criticized for imposing on the patients unnecessary inconvenience, discomfort, and complications, without securing, in return, better relief from pain or healing in better alignment than would the application of a simple arm sling (Lester 1929, Nicoll 1954, Fowler 1962, 1968, Le Vay 1967, Mullick 1967, Sankarankutty & Turner 1975).

We report a prospective, randomized clinical study with the purpose of comparing the course of treatment and the results obtained by treatment of midclavicular fractures with either a figure-of-eight bandage or a simple sling.

Materials and methods

From June 1, 1981 to September 30, 1982, 79 consecutive out-patients were included in the study. These patients had as their only injury a midclavicular fracture between the costoclavicular and coracoclavicular ligaments without perforation of the skin or primary neurovascular symptoms. Only patients above the age of 13 and inhabitants of the Aarhus County were included. The investigation complied with the 2nd Helsinki Declaration. After radiographic verification of the fracture and obtaining of informed consent, the patients were allocated by means of random numbers from the Geigy Tables (Leitner 1982) to treatment with a figure-of-eight bandage or a simple sling. After 2 days, and after 1 and 2 weeks, the figure-of-eight bandage was to be checked and adjusted by the patients' own general practitioner, who did not have access to the radiographs. The bandage was to be used for 3 weeks. The simple sling was to be used only as long as the patient felt a need for it, and no routine controls were demanded. All the patients were encouraged to commence exercising shoulder mobility as soon as possible.

Eighteen of the 79 patients who originally entered into the study did not conclude the regimen. Eleven of them had been allocated to treatment with a figure-of-eight bandage. One of them refused all treatment and discarded the bandage. In 1 patient, the application of the bandage caused increased pain that was immediately relieved upon removal; 1 further patient had edema and paresthesia of the arm, clinically diagnosed as deep venous thrombosis, and 2 patients had displacement of primarily undisplaced fractures, in 1 accompanied by edema of the arm; in the latter 3 patients, symptoms developed shortly after tightening of the bandage. All 4 patients with discomfort from bandaging had an uneventful course after change of treatment to a simple sling. Six patients defaulted the follow-up examination.

Seven patients had originally been treated with a simple sling. One of them treated himself with bed rest for 5 weeks; another had to be treated with a Velpeau bandage for a week because of pain; 1 other patient suffered a hemiplegic attack shortly after her fracture; and 4 patients defaulted the follow-up.

Sixty-one patients completed the study; 34 of them were treated with a figure-of-eight bandage and 27 with a simple sling. The median age was 19 (14-81)

Table 1. Sixty-one midclavicular fractures randomized in two treatment groups.

Fracture types and dislocations	Figure-of-eight bandage	Simple sling
Two-fragment fracture	25	20
One intermediary fragment	7	5
Two or more intermediary fragments	2	2
Undisplaced	3	3
Minor displacement[a]	15	12
Major displacement[b]	16	12
N	34	27

[a] Fragments in contact, angulation ≦ 20° and shortening ≦ 1 cm.
[b] Fragments not in contact / angulation > 20° / shortening > 1 cm.

years in the figure-of-eight group and 19 (14-66) years in the sling group. Side and sex distribution were similar in the two groups. All fractures were caused by low-energy indirect trauma. The types of fracture and degrees of dislocation are shown in Table 1.

The follow-up examination was undertaken by two of the authors (K.A. & P.Ø.J.) after a median interval of 12 (10-16) weeks for the figure-of-eight group and 13 (10-17) weeks for the sling group. It included recording the course of treatment, clinical and radiographic examination, and interrogation regarding the patients' subjective satisfaction with the method of treatment and the result. A blind procedure, unfortunately, was not practicable.

For the evaluation a score system was constructed that ignored the differences between the two treatment schedules concerning the duration of bandaging and the number of visits to the general practitioner. The higher score a patient obtained, the more cumbersome the course of treatment had been and/or the less optimal the result was (Table 2).

The Mann-Whitney test was used for statistical analysis.

Results

We found a significant difference between the two treatment groups concerning the course of treatment that was in favor of the simple sling.

Table 2. Scoring system used for evaluation and mean point scores for individual parameters

Parameters (possible points)	Mean point score (range) Simple sling	Figure-of-eight bandage
1. *Course of treatment*		
Duration of bandaging (0–3)[a]	0.5 (0–3)	0.3 (0–3)
Discomfort from treatment (0–7)	0.3 (0–2)	1.2 (0–5)
Severity of discomfort (0–3)	0.3 (0–2)	1.1 (0–3)
Duration of discomfort (0–2)	0.3 (0–2)	1.1 (0–2)
Number of visits on general practitioner (0–4)[b]	0.3 (0–3)	1.1 (0–4)
Use of analgetics (0–2)	0.3 (0–3)	0.3 (0–2)
Duration of pain (0–4)	1.4 (0–4)	1.8 (0–4)
Duration of functional impairment (0–3)	0.6 (1–3)	1.0 (0–3)
Duration of sick leave/disablement (0–4)	1.4 (0–4)	1.4 (0–4)
Complications (0–8)	0.0	0.3 (0–2)
2. *Follow-up examination*		
Clinical examination		
Deformity at fracture site (0–3)	1.2 (0–3)	1.3 (0–3)
Skin problems (0–1)	0.0	0.0
Neurovascular symptoms (0–3)	0.0	0.0 (0–1)
Impairment of shoulder motion (0–3)	0.0 (0–1)	0.1 (0–1)
Weakness of shoulder muscles (0–3)	0.0 (0–2)	0.1 (0–2)
Pain from movement (0–3)	0.3 (0–2)	0.3 (0–2)
Tenderness of fracture-site (0–3)	0.2 (0–1)	0.3 (0–2)
Patients assessment of result (0–4)	0.6 (0–4)	0.8 (0–4)
Radiographic examination		
Healing of fracture (0–3)	0.2 (0–1)	0.1 (0–1)
Amount of callus (0–2)	0.7 (0–2)	0.8 (0–2)

[a] For simple sling, points were given for use of bandage exceeding 1 week, but for figure-of-eight bandage only after more than 3 weeks.
[b] For figure-of-eight bandage, four visits were allowed before points were given, but for simple sling only two.

Table 3. Alignment of healed fracture compared with initial displacement.

Group	Displacement			N
	Diminished	Unchanged	Increased	
Figure-of-eight bandage	1	30	3	34
Simple sling	2	21	4	27

The results from the two methods of treatment were similar.

The median point score for the course of treatment was 8 (mean 10.3, range 0-31) for the figure-of-eight group and 4 (mean 6.0, range 0-22) for the simple sling group ($P = 0.01$). The difference seemed to be principally caused by a diversity in the discomfort caused by the bandages, such as impairment of agility and personal care, sleep disturbances, edema of the arm, and paresthesia (Table 2).

The actual median duration of bandaging was 1 (0-3) week for the simple sling group and 3 (3-5) weeks for the figure-of-eight group ($P < 0.01$). The median number of visits to the general practitioner was 0 for the simple sling group and 3 for the figure- of-eight group ($P < 0.01$). The period of sick leave or disability and the use of analgetics were similar in the two groups.

Nine patients in the figure-of-eight group were dissatisfied with the course of treatment as opposed to 2 patients in the simple sling group.

The result of treatment was found to be similar for the two treatment groups. The median point score was 3 for both groups. All fractures were radiographically healed at the time of follow-up examination. In both groups the alignment of the healed fractures remained largely unchanged from the initial displacement (Table 3).

Eight of the 10 patients who defaulted the original follow-up examination responded to a questionnaire sent to them 3 years after injury. One patient in the figure-of-eight group had died, and another belonging to the sling group did not reply. All the responding patients stated that the initially instituted treatment had been completed. Only 1 patient, treated with a figure-of-eight bandage, was dissatisfied with the course of treatment owing to skin problems caused by the bandage. Three patients, all treated with a figure-of-eight bandage, reported slight residual symptoms in the form of occasional aching at the former fracture site upon strenuous use of the arm or with changes in weather. One patient in the figure-of-eight group and 1 in the simple sling group reported about a lump at he fracture site, but they did not find this cosmetically disturbing. All 8 patients were satisfied with the result.

Discussion

More than 200 hundred methods have been proposed for the conservative treatment of midclavicular fractures (Lester 1929), ranging from cumbersome plaster spicas and splinting devices to bandaging methods and the application of a simple sling, or outright neglect (Quigley 1950, Neer 1975). It has not been proved in controlled studies that any of these methods is able to yield and maintain reduction of the fractures throughout the period of healing in return for the discomfort and complications they regularly impose. Clavicular fractures heal with very few exceptions no matter how they are treated, perhaps short of operative treatment. Malunion is almost invariably consistent with a functionally and cosmetically satisfactory result (Quigley 1950, Neer 1975, Sisk 1980, Effenberger 1981).

The widely used figure-of-eight bandage provides alleviation for many patients, but often causes skin problems and pain, especially in relation to adjustments; and occasionally neurovascular problems or fracture displacement occur (Packer 1944, Rowe 1968). Several authors have proposed that treatment with a simple arm sling would provide sufficient relief of pain with a minimal number of side effects (Lester 1929, Nicoll 1954, Fowler 1962, 1968, Le Vay 1967, Mullick 1967, Rowe 1968). San-

karankutty & Turner (1975) concluded the same in an uncontrolled study.

We conclude that treatment of the common midclavicular fracture with a simple sling provides a valid alternative to treatment with a figure-of-eight bandage. The functional and cosmetic results of the two methods of treatment are identical, but to many patients the simple sling may provide a more comfortable course of treatment and perhaps fewer complications. Reduction of displaced fractures is not furnished by either of the two methods of treatment.

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