Epidemiology of scapular fractures

Incidence and classification of 338 fractures

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We have studied scapular fractures, with special reference to intraarticular glenoid fractures, during a 10-year period in 2 Swedish counties. There were 338 scapular fractures in 322 patients. The annual incidence was $10/10^5$ inhabitants, of which 30 percent affected the glenoid cavity. Out of 100 intraarticular glenoid fractures, 55 occurred in men and 45 in women. The mean age of the women at the time of fracture (64 years) was significantly higher than the mean age of men (49 years). The most common intraarticular glenoid fracture type was the anterior chip fragment fracture which, in about two-thirds of the cases, was associated with shoulder dislocation.

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Epidemiological data concerning scapular fractures, and especially intraarticular fractures of the glenoid, are limited (de Mourgues et al. 1972, Wilber and Evans 1977, McGahan et al. 1980).

We have studied the epidemiology of scapular fractures in 2 Swedish counties during a 10-year period with special reference to intraarticular glenoid fractures and their classification.

Patients and methods

The radiological departments in the 2 Swedish counties of Uppsala and Västerås, with a total population of about 325,000 inhabitants, provided us with copies of all radiographs of shoulders and scapula where fractures had been observed during a 10-year period. Only permanent residents were included. Intraarticular fractures were classified into 5 main types based on conventional AP and lateral radiographs according to Ideberg (1984) (Figure1). Chip

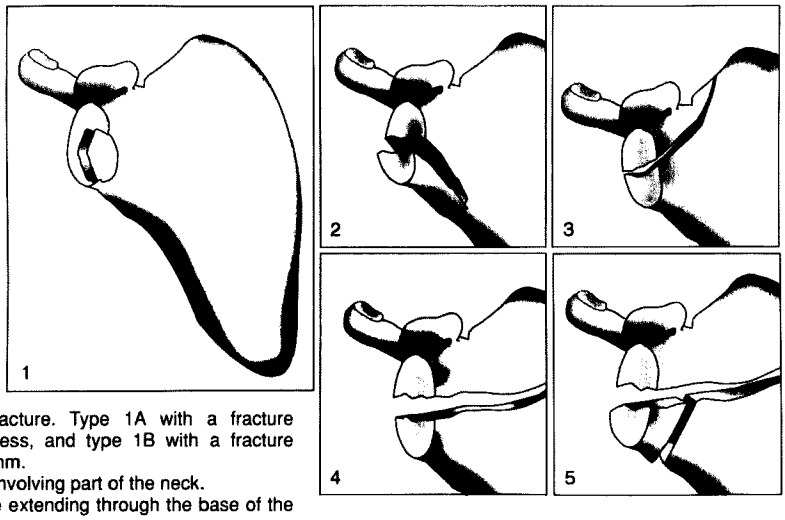

Figure 1. Classification of intraarticular glenoid fractures.

Type 1 Anterior glenoid rim fracture. Type 1A with a fracture fragment of 5 mm or less, and type 1B with a fracture fragment larger than 5 mm.
2 Inferior glenoid fracture involving part of the neck.
3 Superior glenoid fracture extending through the base of the coracoid process.
4 Horizontal fracture involving both scapula neck and body. Fracture line always runs inferior to the spine of the scapula.
5 Horizontal fracture (as in type 4), with an additional complete or incomplete neck fracture.

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Table 1. Data on 99 patients with 100 intraarticular glenoid fractures

Fracture type	1A	1B	2	3	4	5
Number of fractures						
Men	30	14	2	1	4	4
Women	20	21	1	–	2	1
Age in years						
Men	46	53	65	47	51	47
Range	21–70	23–76	55–75	–	28–77	28–82
Women	60	69	22	–	66	78
Range	25–86	48–92	–	–	58–74	–
Additional shoulder lesion						
Dislocation	33	23	–	–	–	–
Subluxation	12	7	1	–	–	–
Nerve lesion	4	1	–	–	–	–
Additional skeletal injury	22	15	2	1	–	3

fragment fractures, often seen in shoulder dislocations, are included in this classification as fracture type 1, with subdivision into 2 types, depending on whether the size of the fragment is less or equal (type 1A) or larger (type 1B) than 5 mm when measured directly on the film. Medical records were used to extract clinical data, including age, sex, side, and associated shoulder injuries.

The statistical probability was calculated by ANOVA for multiple comparisons, the Student's t-test for 2 means and Fischer's exact test for proportions. The chosen level of significance was 0.05.

Results

There were 338 scapular fractures in 322 patients. In 100/338 fractures (99/322 patients) the glenoid cavity was involved, i.e., the fracture was intraarticular. The annual incidence of scapular fractures was about $10/10^5$ inhabitants, of which intraarticular glenoid fractures constituted about 1/3.

The mean age of patients with fracture type 1A was 60 years for women and 46 years for men ($p < 0.002$), while for fracture type 1B the average age was 69 (women) and 53 (men) years ($p < 0.001$), respectively. The age difference between women with type 1A and 1B fractures was significant ($p < 0.02$) while the difference in age between men with type 1A and 1B fractures was not significant. There was no difference in fracture type distribution between genders (Table 1).

In 56/85 type 1 fractures there was an association with dislocation of the shoulder joint. None of the other fracture types was associated with shoulder dislocation. Men with subluxation of the humeral head, defined as more than 3 mm from the anatomical position, were significantly older (mean age 60 years) than men with luxation (mean age 46 years) as well as men with no luxation (mean age 46 years). In women, there was no difference in age between patients with luxation, subluxation or those without luxation at the time of fracture.

An associated incomplete and temporary nerve injury involving the axillary nerve was seen in 5 patients having type 1 fractures with associated shoulder dislocation. Additional skeletal injuries in the shoulder, including Hill-Sachs lesions, fracture of the clavicula or acromion was seen in 43 shoulders, including 2 shoulders with Hill-Sachs lesions without a history of shoulder dislocation.

Discussion

The proportion of intraarticular glenoid fractures in this study was higher than previously reported (de Mourgues et al. 1972, Imatani 1975, McGahan et al. 1980). The discrepancy is probably in part due to differences in the classification of intraarticular glenoid fractures. We included all visible fractures of the glenoid cavity, i.e., all chip fragment fractures associated with shoulder dislocation. If fracture type 1A, i.e., chip fragment size 5 mm or less, had been excluded we would have had a proportion of intraarticular glenoid fractures of about 20 percent of all scapular fractures, which would have been close to the findings of McGinnis and Denton (1989). It has been pointed out that the extraarticular scapular fractures through the neck, spine and body might be missed on conventional AP and lateral radiographs (Neer 1975, Harris and Harris 1988). As additional projections (Gutjahr 1983) or CT scans (Laumann and Kramps 1984) had not been used on a regular basis, some fractures might have been missed. Any failure in detecting extraarticular fractures will obvi-

ously increase the proportion of intraarticular glenoid fractures.

We were unable to include scapular fractures in patients who suffered lethal injuries. According to Goss (1992) about 2 percent of patients with glenoid fractures sustain fatal injuries. Even with less severe associated injuries, it is known that many scapular fractures are associated with multiple injuries (Imatani 1975, Wilber and Evans 1977, McGahan et al. 1980).

The differences in age between sexes might imply different trauma mechanisms, although this question was not addressed in our study. Since the majority of the women were older, osteoporosis have influenced the future rate.

Associated shoulder dislocation was documented in about two-thirds of all type 1 chip fragment fractures. Considering the kind of trauma mechanism that will cause a type 1 fracture, there is reason to believe that the actual proportion might have been even higher. If the shoulder had been reduced spontaneously, the patient might not have observed the dislocation or subluxation causing the chip fragment fracture. In fact, it is hard to imagine any other trauma mechanism, except a dislocating humeral head that would generate a type 1 fracture. Large chip fragments have often been regarded as a consequence of direct trauma—for example, when falling on the shoulder (Kummel 1970, Aston and Gregory 1973)—while fractures with small fragments, such as type 1A fractures, have been associated with trauma against an outstretched arm, i.e., an indirect trauma mechanism (Bankart 1938, Rowe et al. 1984). However, Neer (1975) regarded not only small but also large chip fragment fractures as either a consequence of direct trauma to the shoulder or a result of avulsive forces at the joint capsule during dislocation. In studies of shoulder dislocations, chip fragment fractures are seen in 8–20 percent (Hierholzer and Hax 1982, Hovelius 1982).

Close to half of the cases having a second skeletal injury in the shoulder girdle are comparable to previous findings (McGinnis and Denton 1989, Goss 1992).

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