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Reoperations of hip fractures

The incidence and type of reoperations after osteosynthesis of cervical and trochanteric femoral fractures in the city of Göteborg, Sweden was studied from 1965 through 1981. The yearly incidence of reoperations decreased for both types of fractures over the years. Reoperations after cervical fractures were frequent, occurring in about 30 per cent. There were few reoperations after trochanteric fractures on the other hand, 3.6 per cent in 1981.
Arthroplasties comprised the greatest number of reoperations, with a fairly constant relative frequency of about 18 per cent during the study period.

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The incidence of fractures of the proximal end of the femur has increased in Scandinavia and Great Britain during recent decades (Falch & Ilebekk 1978, Jensen 1980, Zetterberg & Andersson 1982, Swanson & Murdoch 1983, Nilsson 1984, Zain Elabdien 1984).

The purpose of this study was to evaluate if the increase in fracture rate has led to an increased number of complications, expressed as reoperations. Secular tendencies during the last 16 years were evaluated.

Material and methods

All cervical, trochanteric and subtrochanteric fractures of the proximal end of the femur occurring in Göteborg, Sweden, in 1965, 1970, 1975, 1977 and 1981 including reoperations of such fractures were studied. The city population was rather stable at about 440 000 inhabitants during this period.

The main source of information was the operation records from which primary operations as well as reoperations were tabulated. The number of reoperations each year was related to the incidence of new fractures in the same year. Thus, comparison was not made patient for patient, but instead the time trends of fracture rate and reoperation rate were compared over the same 16-year period.

Primary treatment during the 16-year period studied. In 1965, cervical fractures were treated with closed reduction and osteosynthesis with a three-flanged nail, and trochanteric fractures with closed, in some cases also open reduction and osteosynthesis with an Aronson or Thornton or McLaughlin nail and plate.

In 1970, 1975, 1977 and 1981, cervical fractures were treated with a spring-loaded, flanged nail, according to Rydell (1964).

Trochanteric fractures were treated by Richard's sliding-screw-plate in 1970 through 1981 at one orthopaedic centre. The other centre (50 per cent of the patients) used angled AO-plates, Thornton and McLaughlin devices in 1970 and 1975 and AO-plates and Ender nails in 1977. In 1981, Richard's sliding-screw-plate was the only method used.

Primary prosthetic replacements were only used in a few cases of cervical fractures impossible to reduce at surgery.

Statistics. The statistical test for trend in contingency table was performed according to Maxwell (1961).

Results

The total number of fractures in 1965–1981 was 3143; the fracture rate doubled during this period (Table 1). The increase was most pronounced for cervical fractures in men and trochanteric fractures in women. A total of 668 reoperations was performed in the years studied, and there was a relative decrease in reoperations from 28 per cent to 17 per cent.

Cervical fractures

In the cervical fractures the absolute number of reoperations increased during the study period, but due to the even greater increase in number of fractures the relative reoperation frequency decreased ($p < 0.01$). The relative proportion of all procedures decreased (Table 2).

The proportion of secondary arthroplasties was about the same during the period 1965–1981, about 18 per cent. Except for arthroplas-

ties, the dominating reoperations in cervical fractures were extraction of nails.

Trochanteric fractures

Reoperations of the trochanteric fractures were mainly extraction of the osteosynthesis devices (Table 3). This was in most cases due to irritation in the trochanteric area and not due to any technical failure. The increased rate of reoperations observed in 1977 was due to the introduction of the Ender nail technique at one of the orthopaedic departments. Eighteen of the 29 reoperations that year were due to technical problems with the Ender nails; mostly early slipping of nails which required renailing. The use of AO-plates in one department and Richard's sliding-screw-plate in the other did not cause any difference in the reoperation rate in 1975. The statistical test for time trend shows a significant decrease in reoperations from 1965 to 1981 ($p < 0.001$).

Discussion

Overall, there was a decreasing relative rate of reoperations in hip fractures from 1965 to 1981, in both cervical and trochanteric fractures. This was probably due partly to better operative facilities, e.g. fluoroscopy, and partly to better methods of fixation. The increasing number of fractures may also have increased the individual surgeons' experience and skill. Improved results as a function of time have been observed in other studies of hip fractures in both older (Fielding 1980) and younger (Zetterberg et al. 1982) patients.

This study shows that the absolute or relative frequency of extraction of osteosynthesis, reosteosynthesis, and Girdlestone procedures decreased during the period studied, while the relative number of arthroplasties remained fairly constant.

The number of reoperations performed is dependent not only on the need for such proce-

Table 1. All hip fracture operations 1965–1981 in Gothenburg.

Year	Primary operations				Total	Reoperations		
	Cervical		Trochanteric			Cervical	Trochanteric	Total (%)
	Women	Men	Women	Men				
1965	207	52	120	64	443	96	26	122 (28)
1970	237	53	152	59	501	117	18	135 (27)
1975	238	81	180	89	588	89	11	100 (17)
1977	297	85	202	122	706	128	29	157 (22)
1981	354	132	295	124	905	139	15	154 (17)
Total	1333	403	949	458	3143	539	99	668 (21)

Table 2. Reoperations for cervical hip fractures 1965–1981 in Gothenburg.

Type of operation		1965 N(%)	1970 N(%)	1975 N(%)	1977 N(%)	1981 N(%)
Arthroplasty						
Primary,	hemi	6 (2)	9 (3)	10 (3)	8 (2)	6 (1)
	total				1	
Secondary,	hemi	36 (13)	47 (17)	28 (10)	47 (16)	38 (17)
	total		1	4	13	43
Extraction of nail		31	46	31	47	42
Girdlestone		6	4	3	2	4
Reosteosynthesis		13	8	5	4	1
Subtrochanteric fracture			1	4	3	5
Other		4	1	4	3	–
Total		96 (37)	117 (40)	89 (28)	128 (34)	139 (29)
Total number of fractures		259	290	319	382	486

Table 3. Reoperations for trochanteric fractures 1965–1981 in Gothenburg.

Type of reoperation	1965 N(%)	1970 N(%)	1975 N(%)	1977 N(%)	1981 N(%)
Extraction of osteosynthesis	21	16	6	13	14
Reosteosynthesis	5	2	3	12	1
Secondary arthroplasty			1	2	
Other			1	2	
Total	26 (14)	18 (9)	11 (4)	29 (9)	15 (4)
Total number of fractures	184	211	269	324	419

dures, but also on the hospital resources, which vary; in this study there was a lack of aftercare resources in 1975, which probably partly explains the lower proportion of reoperations that year.

As some of the reoperations were performed a maximum of 1–3 years after the initial osteosynthesis, and the increase in fracture frequency accelerated in the later years studied, the proportion of reoperations may be rather low, as we have compared the number of reoperations with the number of fractures in the same years.

Cervical fractures

The proportion of arthroplasties performed was fairly constant, around 18 per cent. This does not necessarily mean that the rate of pseudarthrosis and avascular necrosis has been constant; since prosthetic devices are better today the indications for reoperation can be more liberal.

The number of primary arthroplasties was low throughout, around 2 per cent. The reason for this is our strict indications: only fractures which are impossible to reduce receive a primary prosthesis. No age-related or fracture-stage-related indication was used.

Arthroplasty as a secondary procedure was performed in patients with pseudarthrosis and necrosis giving disabling pain. This implies that the incidence of pseudarthrosis and avascular necrosis was higher than these 18 per cent. We do not know the actual figures, however, but there is a close correlation between disability and necrosis, at least in mobile patients (Zetterberg et al. 1982). An increasing proportion of total arthroplasties has been performed. The indication for this procedure was damage to the acetabular cartilage.

Reosteosynthesis is not recommended in technical failure of a nailed cervical fracture because of the very high complication rate (Carlqvist 1947, Zetterberg et al. 1979), and was almost completely abandoned in the later years studied. It is preferable to do an immediate prosthetic replacement in these patients.

The proportion of Girdlestone procedures decreased during the period studied. The procedure was used as a salvage operation in cases where contraindications to prosthetic replacements were felt to exist; for example, in senile nonambulatory patients, and patients with pareses. Fracture at the insertion hole of the four-flanged nail was regularly seen with the nail used in this series; the incidence of this fracture was low, 1.5 per cent. This corresponds to the fracture incidence found with other fixation devices (Howard & Davies 1982). The complication can be reduced if a device with a lateral plate is used.

The relative number of nail extractions has decreased. Increased awareness of the uselessness of this procedure in cases with necrosis is probably the reason for this decrease. A prosthetic replacement is a better solution in most cases. There are, however, patients with bursitis at the trochanter region who benefit from nail extraction.

Trochanteric fractures

The results in the trochanteric fractures, both stable and unstable, were good when the Richard's sliding-screw-plate was used in the later

years studied, with only 3.6 per cent reoperations in 1981. This is in agreement with Jensen et al. (1980a). The one department using AO-plates during the early seventies also had good results. The introduction of Ender nails doubled the rate of reoperations and this method was abandoned. However, with increased experience, the results after Ender nailing are also reported to be good (Nilsson 1984, Zain Elabdien 1984). Our high rate of reoperations when the Ender or McLaughlin methods were used, especially in unstable trochanteric fractures, is in agreement with results by others (Sahlstrand 1974, Jensen & Michaelsen 1975, Jensen et al. 1978, Jensen & Sonne-Holm 1980, Jensen et al. 1980a, b, Pankovitch & Tarabishy 1980, Marsh 1983).

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