

Preoperative traction for hip fracture

A randomized comparison between skin and skeletal traction in 78 patients

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153 consecutive patients with displaced cervical and trochanteric hip fractures were considered for inclusion in this study. 75 were excluded because of senile confusion and the remaining 78 were randomized to skeletal or skin traction preoperatively. The effect on pain alleviation was evaluated with a Visual Analogue Scale (VAS) and by the number of doses of analgesics administered. The processing time through the emergency department, radiographic department and to the ward, as well as time to operation, was registered. No significant difference in the

VAS pain evaluation was found. There was a small significant increase in consumption of analgesics of no clinical importance in patients with skin traction, and no effect of traction type on the processing time or time to operation. Fracture type did not affect the outcome. Since half of the patients found the application of skeletal traction painful, compared to one fifth with skin traction, skeletal traction should not be routinely used to alleviate pain preoperatively in these patients.

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Some form of traction is commonly used preoperatively for displaced hip fractures (Billsten et al. 1996). Skin traction is easier to apply than skeletal traction and might speed up handling in the emergency department. We randomized patients with displaced hip fractures to either skin or skeletal traction and analyzed the effect on preoperative pain and on patient flow.

Patients and methods

153 consecutive patients with displaced hip fractures were considered for the series. 75 were excluded because informed consent could not be obtained. This was usually due to senile confusion, although 5 declined participation, and 3 were excluded due to local skin problems, such as leg ulcers. The age and sex distributions of the excluded patients were the same as for the included patients but there was a somewhat higher proportion of trochanteric fractures in the excluded patients.

78 patients (average age 81 (58-97) years, 57 women) were randomized to receive either skin or skeletal traction. 40 (22 cervical and 18 trochanteric) had skin traction and 38 (21 cervical and 17 trochanteric) had skeletal traction.

Skeletal traction was applied at the emergency department under local anesthesia with a K-wire

through the proximal tibia. The leg was placed in approximately 30° flexion on a sled, and a weight of 5-10% of the patient's body weight, approximately 3-5 kg was applied. The skin traction consisted of a foam rubber boot, which was strapped around the leg over a thin cotton stocking. The leg was placed in a traction sled as above and a 3 kg weight, which is the maximum the boot withstands, was applied.

Patients received analgesics on clinical indications, generally ketobemidon subcutaneously shortly after arrival at the emergency department. On the ward, both ketobemidon and a combination of dextropropoxyphen and paracetamol were used. Doses were given according to body weight.

Pain was evaluated with a Visual Analogue Scale (VAS), a continuous scale, where 0 is pain-free and 10 is the worst pain imaginable. The number of doses of analgesics given at the emergency department and on the ward were recorded. Injections and oral medication were combined in the analysis. The interview was conducted by a nurse immediately after the patients' arrival in the emergency department, after the administration of analgesics, in conjunction with the application of traction, and approximately half an hour after the application of traction. Complications, such as erythema, edema, infection and paresthesia, were ascertained on the ward after 3-4 days and by checking the charts.

Table 1. Effect of traction type on pain alleviation, mean SD (95%CI)

	Skin traction n 40		Skeletal traction n 38		Total n 78	
<i>Pain (VAS)</i>						
Arrival emerg dept	6.8	2.8 (5.9-7.7)	6.4	2.7 (5.5-7.3)	6.7	2.7 (6.1-7.3)
After analgesics	4.8	2.5 (4.0-5.6)	3.8	2.0 (3.2-4.4)	4.3	2.3 (3.8-4.8)
After traction	3.4	2.0 (2.8-4.0)	3.3	1.0 (3.0-3.6)	3.3	2.0 (2.9-3.7)
<i>Analgesics (doses)</i>						
Emergency dept	1.1	0.7 (0.9-1.3)	1.1	0.8 (0.8-1.4)	1.1	0.1 (1.08-1.12)
Ward	2.5	1.6 (2.0-3.0)	1.7	1.4 (1.3-2.1)	2.1	1.5 (1.8-2.4)
P-value	0.03					

Pain was measured by the VAS scale and by the number of doses of analgesics consumed by the patients from the time of arrival at the emergency department until they went to the operating room.

Table 2. Effect of traction type on patient flow, mean SD (95%CI)

Time	Skin traction n 40		Skeletal traction n 38		Total n 78	
Arrival to ward (h)	3.7	1.2 (3.3-4.1)	4.0	1.3 (3.6-4.4)	3.9	1.3 (3.6-4.2)
To radiography (min)	48	27 (40-56)	53	53 (36-70)	51	40 (42-60)
To radiography and back (min)	71	30 (62-80)	75	29 (66-84)	73	30 (66-80)
Arrival to bed (h)	2.8	1.2 (2.4-3.2)	3.0	1.2 (2.6-3.4)	2.9	1.2 (2.6-3.2)
Return from radiography to traction (min)	120	40 (108-132)	124	60 (105-143)	122	50 (111-133)
OR time (min)	48	24 (41-55)	58	36 (47-69)	52	30 (45-59)
Time-to-operation (h)	24	13 (20-28)	21	9 (18-24)	23	11 (21-25)

Arrival to ward: time from arrival at the emergency department to arrival at the admitting ward;

To radiography: time from arrival at the emergency department until the patient was taken to the radiology department;

To radiography and back: Turn-around-time at the radiology department;

Arrival to bed: time from arrival at the emergency department (on stretcher) until the patient was given a bed and could have traction applied;

Return from radiography to traction: the time it took after the patient returned from the radiology department until traction was applied;

OR time: actual operating time;

Time-to-operation: time from arrival at the emergency department until the operation started.

The times elapsed between arrival at the hospital and the taking of radiographs, the application of traction and transport to the ward as well as to operation and operation time were recorded.

Statistics

A comparison was made between cervical and trochanteric fractures and between traction types, with regard to the number of doses of analgesics and subjective pain evaluation on the VAS scale as well as flow characteristics. $P \leq 0.05$ was considered significant. The power of the study, with an effect size of two units of VAS or two doses of analgesics, was calculated at 0.80, with $p \leq 0.01$. The paired and unpaired Student's t-test and chi-square analysis were used.

Results

Pain alleviation (Table 1). There was no difference in the use of analgesics between the groups before application of traction. The skeletal traction group required fewer doses of analgesics on the ward, 1.7 compared to 2.5 ($p = 0.03$). On the VAS scale, there was a significant reduction in pain both after the administration of analgesics (VAS from 6.7 to 4.3) and after the application of traction (3.4) $p = < 0.0001$. The additional reduction in pain when traction was applied after the administration of analgesics was also significant ($p \leq 0.001$) but there was no difference between skin and skeletal traction in either case. There was also no difference between fracture types, with regard to pain. Significantly more skeletal traction patients (16 of 43) than skin traction patients (7 of 35) found the application of traction painful ($p = 0.03$, chi-square).

Patient flow characteristics (Table 2). There was no statistically significant difference between the groups with regard to the length of handling times before arrival on the ward. The average time-to-operation was 23 hours (median 20 hours), with 85% operated within 29 hours after admission.

No complications were seen with either traction type.

Discussion

The use of preoperative traction in hip fractures could be beneficial by alleviating pain through immobilization alone. In a randomized study, Finsen et al. (1992) found no difference in consumption of analgesics with regard to skin traction, skeletal traction or placement on a pillow. Two studies (Anderson et al. 1993, Needoff et al. 1993), also using the VAS scale to evaluate skin traction and pillow nursing in randomized series of patients, found no difference. Another factor in alleviating pain may be the positioning of the hip. Semi-flexion and lateral rotation give the lowest intracapsular pressure, while extension and medial rotation increase the pressure (Strömqvist et al. 1988). Treatment on a sled, which semi-flexes the hip but does not rotate it laterally, may only partially alleviate pain for this reason. However, Needoff et al. (1993) reported an increased consumption of analgesics in patients with traction. An increase in pressure due to lack of external rotation may explain this finding. In our study, all patients had a traction sled, thus the difference between the two types of traction is mainly the lower weight hung on the skin traction. Use of a pillow may allow patients to rotate externally, which may alleviate pain and may explain the positive effect of such treatment.

In our series, although there was a significant reduction in the use of analgesics in the skeletal traction group, 1.7 doses, as compared to 2.5 in skin traction patients, this difference has no clinical importance. The patients' pain decreased, as measured with the VAS scale both after the administration of analgesics and significantly more after the application of traction. Since nursing on a pillow was just as effective in alleviating pain (Finsen et al. 1992, Anderson et al. 1993), a randomized study will be necessary to con-

clude that traction actually does reduce pain rather than act as a placebo.

Another effect of traction could be to allow better reduction of the fracture at operation. This was not dealt with by us, but two studies showed no difference (Finsen et al. 1992, Anderson et al. 1993). A recent report on 10 cervical fractures shows no positive effect of traction, but rather an increase in displacement in 3 patients (Billsten et al. 1996). Our time-to-operation is also rather short, an average of 23 hours.

Since skin traction does not require a doctor for application, we hoped to reduce admission time to the ward by its use. However, we could not find any differences in flow times between the groups. Many factors, such as changing rooms between procedures, waiting for transport to radiology department and to the ward, and the need for help by several members of the staff to take care of the patient have a greater effect on the handling times. These routines must be given more attention.

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References

- Anderson G, Harper W, Connolly C, Badham J, Goodrich N, Gregg P. Preoperative skin traction for fractures of the proximal femur. A randomized prospective trial. *J Bone Joint Surg (Br)* 1993; 75 (5): 794-6.
- Billsten M, Besjakov J, Hyddmark U, Johnell O, Sernbo I. Enquiry in Sweden on the use of traction preoperatively in patients with hip fracture, and a radiological study on the effect of the traction on ten displaced cervical hip fractures. *Acta Orthop Scand (Suppl 270)* 1996; 67: 35.
- Finsen V, Børset M, Buvik G E, Haukle I. Preoperative traction in patients with hip fractures. *Injury* 1992; 23 (4): 241-4.
- Needoff M, Radford P, Langstaff R. Preoperative traction for hip fractures in the elderly: a clinical trial. *Injury* 1993; 24 (5): 317-8.
- Strömqvist B, Nilsson L, Egund N, Thorngren K-G, Wingstrand H. Intracapsular pressure in undisplaced fractures of the femoral neck. *J Bone Joint Surg (Br)* 1988; 70 (2): 192-4.