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Why are we still using pre-operative skin traction for hip fractures?

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Abstract We performed a prospective randomised trial to evaluate the efficacy of pre-operative skin traction for proximal femoral fractures in 311 patients. We found a significant difference in pain score on the evening of admission and the first morning after admission between the groups with traction compared the group without. However, there was no corresponding increase in analgesic requirement during this period. The peak pain score pattern also was different in our population. No other objective benefit can be shown from using skin traction, and its routine use should be abandoned.

Résumé Nous avons mené une étude prospective et randomisée pour évaluer l'efficacité de la traction cutanée préopératoire pour les fractures fémorales proximales chez 311 malades. Nous avons trouvé une différence notable dans le score de la douleur le soir de l'admission et le premier matin après l'admission entre le groupe avec traction comparé au groupe sans traction. Cependant, il n'y avait pas d'augmentation correspondante de la nécessité d'analgésiques pendant cette période ou la douleur était cotée au plus haut. Aucun autre avantage objectif d'utiliser la traction cutanée n'a été montré et son usage habituel devrait être abandonné.

Introduction

A recent survey in Sweden by Billsten [2] confirmed that pre-operative traction is still a common practice. This is despite the existence of three publications at the time this

survey was carried out [1, 3, 5]. Therefore, it appears that the available literature is still not convincing enough for most orthopaedic units.

Most surgeons believe the main theoretical advantage for traction is that it will reduce pain at the fracture site whilst the patient is waiting for surgery. The other possibility, that of ensuring an easier reduction of the fracture at the time of the definitive operation, always has been less convincing, especially when some units can treat these fractures within a matter of days. For intra-capsular fractures, further advantages of traction have been proposed, such as the possibility of a reduction of circulatory complications. For example, traction may reduce any tamponade effect within the joint [4]. Secondly, it may reduce the movement at the fracture interface and deformity at the fracture site. Either effect might reduce the risk of obstruction of, or damage to, the tenuous blood supply to the femoral head via the retinacular vessels. It has been postulated that these two effects might lead to a reduction in the incidence of non-union or avascular necrosis; however, outcome evidence to support this is lacking.

Skin traction does, however, have potential disadvantages. It makes nursing the patient more difficult; for example, lifting the patient onto a bedpan or in pressure area care prior to surgery. Other possible adverse effects are damage to the skin by mechanical shearing, ischaemia to the limb from tight bandages, or allergy to adhesive strapping. The potential complications are far greater if skeletal traction is used instead. Contradictory clinical studies have suggested that the position of slight flexion, abduction and external rotation of the hip achieve the lowest intra-capsular pressure [8]. This is contrary to the position used for traction; the hip in extension, instead, may thereby increase intra-capsular pressure [9].

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Patients and methods

Patients admitted between August 1995 and December 1997 with proximal femoral fractures were considered for the study. Those

Table 1 Patient data

	Gender		Average age	Pre-admission interval	Hemi-arthroplasty	Dynamic hip screw	Percutaneous hip screws	Others
Traction (n=166)	F=103 (62%)	M=63 (38%)	78.4 (SD 11) Range 22–101	0.73 (SD 0.59) Range 0–4	52 (31%)	99 (60%)	10 (6%)	4 (3%)
No traction (n=145)	F=102 (70.3)	M=43 (29.7%)	79.7 (SD 11) Range 23–96	0.73 (SD 0.62) Range 0–3	45 (31%)	78 (54%)	16 (11%)	5 (4%)

Table 2 Waiting time till operation (D days)

	This study	Finsen et al. [3]	Needoff et al. [5]
All patients	4.71 (SD2.99)		
Skin traction	4.73 (SD2.16)	1 (range 10–52)	5/30 (17%) remaining beyond D2
No traction	4.69 (SD2.99)	1.08 (range 10–90)	4/34(12%) remaining beyond D2
Skeletal traction		0.96 (range 0–9)	

Table 3 Operative details and parameters

	Overall blood loss (ml)	Hemi-arthroplasty	Dynamic hip screw	Percutaneous hip screws
Traction	201 (SD 219)	199 (SD 170)	206 (SD 244)	44 (SD 25)
No traction	172 (SD158)	185 (SD 141)	182(SD165)	44 (SD 58)

who agreed and were eligible according to our criteria were admitted to the study. Patients were randomised into the two study arms depending on whether their hospital admission number was an even or an odd number. Those in the case group were not given traction, and a pillow was placed under the injured leg. Those in the control group were given foam boot traction with a 2-kg weight.

We excluded patients if they were senile or had been taking regular analgesia prior to admission. We used a simple mental test score based on orientation in person, time and place. We did not use other standardised scores because none have been validated for the Chinese language. We decided not to exclude patients with peripheral vascular disease or skin problems because the foam boot method is less prone than the skin adhesive method for complications related to these two conditions. We did not experience any complications as a result of these exclusion criteria.

A research assistant trained to collect pain scores and perform the simple mental testing collected the data. Pain scoring using a visual analogue scale was performed four times a day. The exception was the nocturnal pain score, which was performed by the nursing staff. This was due to the fact that the research assistant could not be present on a 20-h basis. Drug dispensation was performed five times a day. The following data were collected: age, sex, mental state score, waiting interval until operation, type of fracture, operating time, blood loss and surgeon. We also documented the time interval between injury and admission, as we noticed that some elderly patients had ignored the injury initially and this delay could influence the outcome.

All patients were allowed a standardised choice of analgesics consisting of Dologesic (paracetamol 325 mg plus propoxyphene napsylate 50 mg) one or two tablets, four times a day, or Doloxene (dextropropoxyphene napsylate) 50 mg intra-muscular injections every 4 h, on an as required basis. Pain scoring was performed prior to each drug round. The analgesic requirements were transferred directly from the drug charts.

The data were analysed using SPSS version 10.0 (SPSS Inc., Chicago, Illinois, USA). Statistical significance was considered present if $P < 0.005$.

Results

We analysed the results of 311 patients. There were a total of 205 women and 106 men (Table 1). Average age was 79 years (SD 10.99; range 22–101). Only three patients were less than 50 years old. The time from injury to admission was on average 0.7 days (SD 0.6; range 0–4). The waiting period from admission until surgery was an average of 4.73 days (SD 2.96; range 1–14) for the traction group and 4.69 days (SD 3.03; range 0–16) for the no traction group. The overall mean waiting interval until surgery was 4.71 days (SD 2.99). Our patients had to wait longer for their operation compared to that published (Table 2).

Time-specific pain scores on the evening of admission and first pain score on the day 1 after admission of the no traction group showed a statistically significant increase ($P < 0.001$). There was a corresponding increased requirement for analgesia but there was no difference between the two groups. Mean daily pain score on the day of admission, day 1 and day 2 was not statistically different between the two groups (Table 3). Peak pain scores in both groups occurred on day 1 (Fig. 1). Analgesic requirements also peaked on day 1 (Fig. 2).

Using the histogram-like “stem and leaf” function of the SPSS software, we found that 70% of patients in both groups required only three or less tablets of analgesia. The medication was taken mostly with the initial 3 days. This pattern is similar to that described by Anderson et al. [1].

Operation details of the two groups are shown in Tables 1 and 3. The groups are comparable. Stratification of the surgeons into four groups with different levels of

Fig. 1 Pre-operative pain score

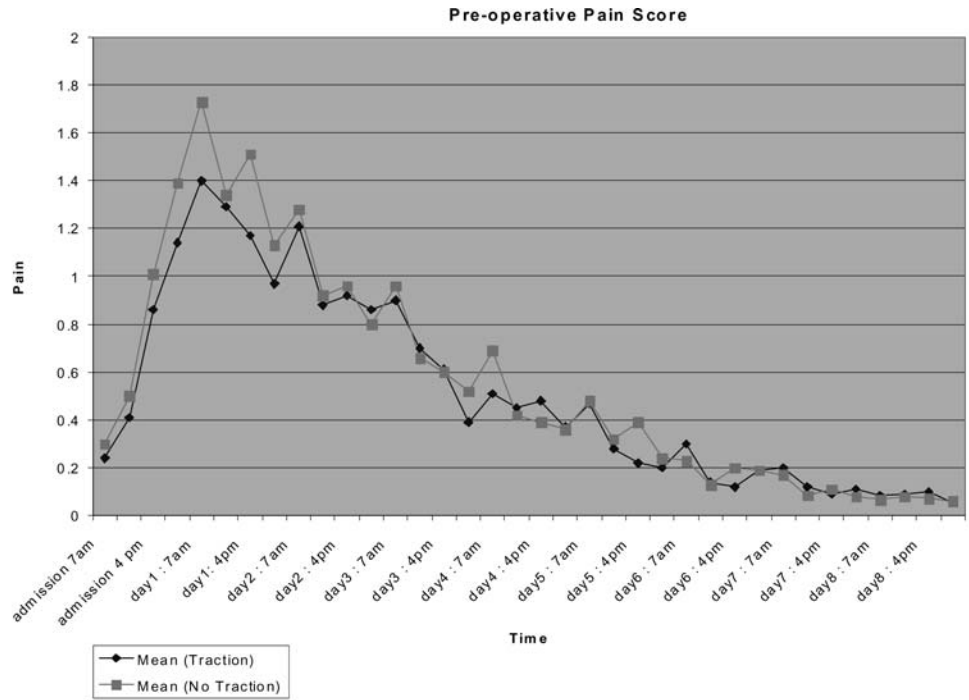
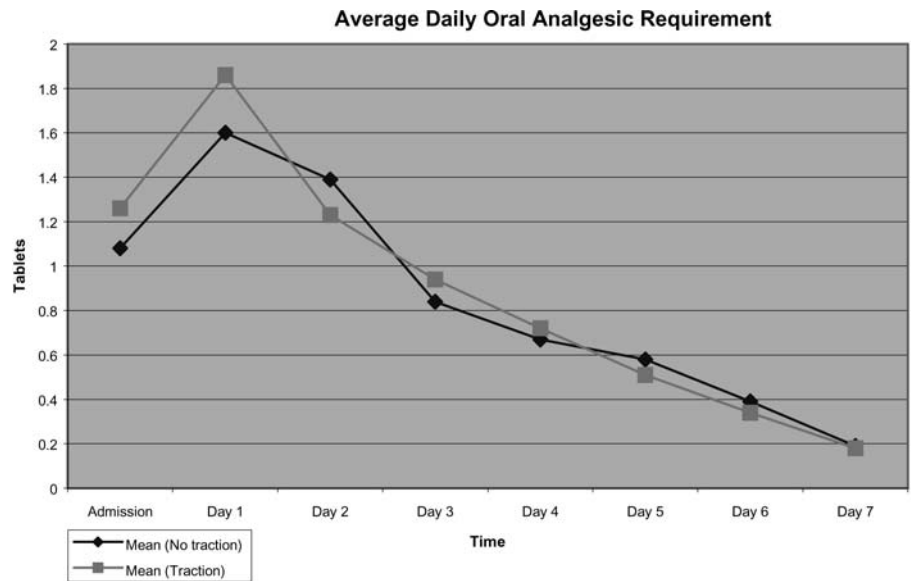


Fig. 2 Average oral analgesic requirement



experience revealed no significant difference in relation to blood loss or operative time. The type of fracture showed no association with operative factors.

No complication attributed to the use or no use of skin traction was experienced.

Discussion

Many books on the subject of how to apply skin and skeletal traction to patients with hip fractures have been written. All these text have in common a very dogmatic regime with specific methods and applicable weights.

However, none have evidence supporting them. At the beginning of our trial, we were aware of only one randomised trial [1] of significant size on this subject. Since then, there have been two other publications [6, 7]; they are much smaller than our study. This trial was prompted in part by the fact our skin traction method is different to the method used by Anderson et al. [1]. We wanted to address some additional fundamental questions.

Two of the publications have stated that they were able to perform hip surgery within 2–3 days, and Rosen et al. [7] within 24 h. We believe most orthopaedic units are unable to achieve this timeframe. At the beginning of this trial our unit had just established a daily trauma op-

erating list after much negotiation with hospital management. Prior to this, our patients had to wait even longer for surgery. The new operating session allowed us to implement this trial in a more consistent environment. Despite this substantial improvement in operating facility, our review revealed that our patients still had to wait (Table 3). We could not statistically quantify this with the other series due to omission of standard deviation data in their papers [1, 3, 5]. The difference may be partly explained by different stringency for anaesthetic work-up between units. Under the circumstances, we argued that patients who needed to wait longer should be given skin traction. However, our study did not reveal any difference between the two groups. It is possible that the natural history of the pain is that it is worse during the first few days and then adaptation is rapid and therefore not affected by the longer waiting time.

Most units follow the classic advice of 2–4 kg of skin traction. Asians being of smaller stature may benefit more from the same load applied with the skin traction. Assuming that our study population has similar pain thresholds as the English [1] and Norwegian [3] populations, we postulated that skin traction in our population using standard weights could provide a more effective pain control. This turned out not to be the case.

On admission, the pain scores was less than in the following 2 days. Peak pain score for both groups was towards the end of day 1. This different pattern observed was unexpected compared to the previous studies, which showed the highest scores on admission day, which is to be expected. Further analysis of this pain score database confirms a gradual increase in pain score, which peaks on the morning of day 1 (1 a.m.) (Fig. 1). This is difficult to explain. One possible explanation is that disorientation and anxiety on the first night, which is a well-established phenomenon in the elderly, compounded the pain.

The subject of skin traction can longer be considered controversial after the available literature is considered. This is because there are simply no scientific data at all to support it. Our study examined extended indications for the use of skin traction but found no benefit. It revealed that different populations may have different pain

patterns, and more effective treatment should be directed specifically. For example, in our population we should identify those with potentially lower pain thresholds, consider a form of regular analgesia during the peak period and be conscious that this peak is delayed in our population.

In the current climate of evidence-based health care and economic awareness, we should withdraw the routine use of skin traction for proximal femoral fractures.

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