

Less pain with epidural morphine after knee arthroplasty

Poul T. Nielsen¹, Hasse Blom² and Sven-Erik Nielsen³

Twenty-two patients were randomly allocated to systemic opioids or epidural morphine the first 10 days after total knee arthroplasty. Pain was recorded daily in a visual analogue scale, and knee motion was measured on Day 10. Pain was lower in the epidural group, with no difference in knee flexion or range of motion.

In a previous study, we found that more than three quarters of the patients who had total knee arthroplasty suffered substantial pain during the early period of mobilization in spite of intramuscular or oral pain treatment (Nielsen et al. 1988).

In the present study, we compared the efficacy of epidural morphine with systemic opioids after knee arthroplasty.

Patients and methods

Included were patients with arthrosis of the knee for whom uncemented AGC-2000 total knee arthroplasty was planned. Patients with previous arthroplasty of the contralateral knee were excluded. In the preoperative knee evaluation, the Hospital for Special Surgery 100-point scoring system (Ranawat et al. 1976) was applied. The replacements were performed during epidural anesthesia (mepivacain 2 percent), and all the patients determined for epidural anesthesia accepted participation in the study. Informed consent was obtained, and the study was approved by the Ethics Committee. Immediately after the operation the patients were randomly allocated to epidural morphine (Group A) or systemic opioids (Group B).

Twenty-two patients were included in the study. The groups were comparable as regards age, preoperative knee motion, and knee scores (Table 1). After al-

Table 1. Patients randomized to epidural or systemic opioids after knee arthroplasty. Median (range)

	Epidural (n 11)	Systemic (n 11)
Age	67 (57-80)	70 (48-86)
Knee score	61 (46-67)	57 (43-69)
Flexion	115 (90-130)	112 (67-140)
Range of motion	112 (80-130)	110 (55-140)

location, 2 patients were excluded from Group A (1 because of severe nausea and 1 because the catheter slipped out on the third postoperative day) and 1 patient was excluded from Group B (cardiovascular complications).

In Group A, epidural morphine (2-6 mg) was administered three times daily for 10 days: the first dose in the morning before physical therapy, the second in the afternoon after physical therapy, and the third in the evening.

In Group B, ketobemidon (Ketogan[®], 5-7.5 mg x 4 + 5-7.5 mg as required) was administered intramuscularly during the first 5 postoperative days and then on the judgement of the nursing staff.

In both groups, paracetamol (1 g x 4) was administered orally throughout the whole period. Patients allocated to epidural morphine were observed in the intensive care unit after the operation until the following morning, during which period the dose of epidural morphine was adjusted.

Knee mobilization was started on the first postoperative day and included quadriceps exercises and active motion with full weight bearing from the second postoperative day.

Pain evaluation was carried out daily from the first until the 10th postoperative day. After termination of

Departments of Orthopedics¹, Anesthesiology², and Rheumatology³, Hillerød Hospital, Denmark

Correspondence: Poul T. Nielsen, Bakkedraget 14,2, DK-3400 Hillerød, Denmark

Table 2. Knee motion (degrees) on the 10th postoperative day. Median (range)

	Epidural (n9)	Systemic (n 10)
Flexion	80 (70-95)	78 (55-100)
Deterioration	30 (10-50)	39 (5-75)
Range of motion	70 (60-90)	74 (35-95)
Deterioration	30 (10-50)	40 (0-85)

the physical therapy, the patients indicated the pain experienced during mobilization using a visual analogue scale (Huskisson 1974). Side effects of the pain treatment were recorded at the same time. The knee motion was evaluated after physical therapy on the 10th postoperative day by a rheumatologist, who was uninformed about the analgetic regimen.

The Mann-Whitney *U*-test was used for the statistical analysis.

Results

The pain scores in the epidural group were relatively low and rather constant throughout the period (Figure 1). On Days 1 and 10, the pain scores were lower ($P < 0.05$) in the epidural group.

On Day 10, there was no difference between the groups regarding range of motion (Table 2). In the epidural group, all the knees flexed more than 60°, whereas in the control group, four knees flexed 60° or less. One of the latter was mobilized during anesthesia.

In the control group, adverse effects were recorded in 2 patients (1 had nausea and 1 experienced mental confusion). In the epidural group, adverse effects were recorded in 6 patients (3 had nausea, 1 had itching, and 2 had urine retention requiring catheterization).

References

- Benedetti C. Intraspinal analgesia: an historical overview. *Acta Anaesthesiol Scand* 1987;(Suppl 85):17-24.
- Bonica J J. Importance of effective pain control. *Acta Anaesthesiol Scand* 1987;(Suppl 85):1-16.
- Huskisson E C. Measurement of pain. *Lancet* 1974;2(7889):1127-31.
- Nielsen P T, Rechnagel K, Nielsen S E. No effect of continuous passive motion after arthroplasty of the knee. *Acta Orthop Scand* 1988;59(5):580-1.
- Raj P P, Knarr D C, Vigdorth E, Denson D D, Pither C E, Hartrick C T, Hopson C N, Edstrom H H. Comparison of continuous epidural infusion of a local anesthetic and administration of systemic narcotics in the management of

V. A. S. Score

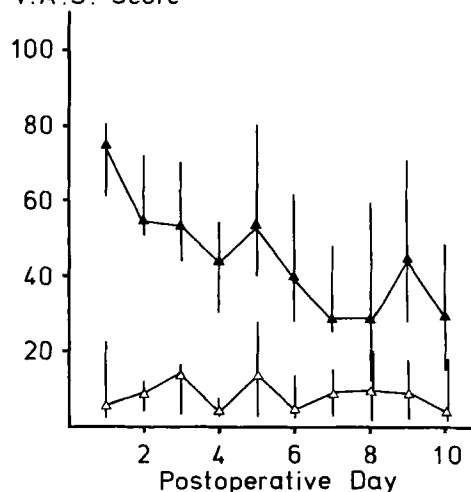


Figure 1. Visual analogue scale pain scores. Median (interquartile range). Δ epidural morphine, \blacktriangle systemic opioids.

Discussion

Inadequate pain treatment after hip and knee replacement affects respiration and circulation, increases the risk of thrombosis, and prolongs the return of normal functions (Bonica 1987).

In a study by Raj et al. (1987), epidural administration of local anesthetics was efficient and superior to systemic opioids in controlling pain after total knee replacement. In contrast to morphine, a local anesthetic causes complete or almost complete motor block in the majority of the patients, thus impeding early, active knee mobilization. The main drawback of epidural morphine is respiratory depression, which may occur within the first 24 hours after administration in up to 5 percent of the patients; hence, close observation is mandatory during this period (Benedetti 1987).

pain after total knee replacement surgery. *Anesth Analg* 1987;66(5):401-6.

- Ranawat C S, Insall J, Shine J. Duo-condylar knee arthroplasty: hospital for special surgery design. *Clin Orthop* 1976;(120):76-82.

Acknowledgements

Financial support was received from The Danish National Research Council. The statistical analysis was performed by Cand. Med. Misser Forrest.