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Lateral position reduces blood loss in hip replacement surgery: a prospective randomized study of 74 patients

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Abstract We performed a prospective randomized study of 74 patients undergoing hip replacement surgery and compared the perioperative blood loss in the lateral position with that in the supine position. The surgeons and surgical technique were the same in the two groups. The patients operated on in the lateral position had a significantly lower total blood loss, on average 201 ml less.

Résumé Nous avons exécuté une étude prospective et randomisée de 74 patients opérés pour remplacement prothétique de la hanche et avons comparé la perte sanguine périopératoire selon la position en decubitus latéral ou en decubitus dorsal. Les chirurgiens et la technique chirurgicale étaient les mêmes dans les deux groupes. Les patients opérés en position latérale avaient une perte totale de sang inférieure de façon significative, en moyenne 201 ml.

Introduction

The advantages and disadvantages of the lateral and the supine positions, respectively, in hip replacement surgery have been discussed among orthopedic surgeons. One advantage mentioned for the lateral position is decreased bleeding during surgery. We have found no previous investigation into this issue. In this study we compared solely the positions and their effect on blood loss. All other factors (surgical approach, anti-thrombotic treatment, non-steroidal anti-inflammatory medication) were the same in both groups.

Patients and methods

Seventy-four patients who were undergoing primary operation for total hip replacement were randomized to one of two groups by

means of a table of random numbers, just prior to anesthesia. In group 1 the patients were supine during the operation and in group 2 the patients were in the lateral position.

In the supine group there were 44 patients (11 men and 33 women). Mean age was 72 (54–91) years and mean weight 75 kg. In the lateral group there were 30 patients (15 men and 15 women), with a mean age of 72 (58–89) years and mean weight of 76 kg.

All patients were operated on because of primary osteoarthritis and none had a history of previous hip surgery. Patients with bleeding disorders were excluded. Anti-inflammatory drugs were withdrawn at least 1 week before surgery. All patients were tested according to Ivy et al. [3] the day before surgery to detect any dysfunction of the platelets.

Thirteen surgeons from the permanent staff at St. Görans hospital performed the operations, using cemented Charnley prostheses (DePuy) in all patients. The surgical technique was a modification of the lateral approach described by Hardinge [2]. All the surgeons used the same operative technique with a minimum of differences. Systolic blood pressure was monitored at 5-min intervals during the operation. All the patients received one drain (Bellovac, Astra). Operative blood loss was estimated by weighing all the swabs and weighing the contents in the suction apparatus, with compensation made for irrigation. The drain was removed 24 h after the operation and the postoperative blood loss was considered equal to the volume collected at that time. All the patients were treated with low-molecular-weight heparin (Fragmin) (5000 IU) once daily for 5–7 days, starting the day before surgery, and all were operated under spinal anesthesia with spontaneous ventilation. Blood transfusions were given according to the surgeon's judgment after clinical assessment and examination of laboratory values. As a general guideline, Hb 80 g/l was the lowest limit before giving a blood transfusion. There were six random dropouts due to insufficient records, four in the supine group and two in the lateral group.

The local ethics committee approved the study. All the patients gave their informed consent.

Blood losses and blood pressures were compared using the Student's *t*-test. Linear regression was used to adjust for the uneven sex distribution. The numbers of transfused patients and differences in distribution between the groups were compared using the chi-square exact test.

Results

The results are presented in Table 1. Though not randomized for these factors, age, weight, height and the side of operation did not significantly differ between the

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Table 1 Results of the study. *SD* Standard deviation

	Supine position		Lateral position		<i>P</i> -value
	Mean	SD	Mean	SD	
Intraoperative blood loss (ml)	723	316	508	316	0.005 ^b
Adjusted value ¹ (ml)	775		509		<0.001 ^c
Accumulated blood loss after 24 h (ml)	1374	458	1273	407	0.322 ^b
Adjusted value ^a (ml)	1472		1273		0.043 ^c
Operating time (min)	77	19	70	11	
Mean systolic blood pressure during surgery (mmHg)	116	14	110	13	0.177
Right hip/ left hip	15/15		28/16		0.403 ^d
Number of patients requiring blood transfusion	30/44		17/30		0.336 ^d
Blood transfusion volume (ml)	407	362	321	341	0.307 ^b

^a Adjustment for uneven sex distribution^b Student's *t*-test^c Linear regression^d Chi-square exact test

two groups. As regards sex there was an uneven distribution. In the group as a whole we found that women had a significantly lower total blood loss. To compensate for the uneven sex distribution between the groups we performed a linear regression. After this adjustment we found a significantly lower blood loss when the patient had been in the lateral position during surgery ($P<0.001$). But even without this adjustment we found a significantly lower blood loss during surgery in the laterally positioned group ($P=0.005$). Furthermore, the total blood loss was lower in the lateral position group ($P<0.043$). The position of the patient did not appear to have any influence on the operating time; neither did the volume of transfused blood differ between the two groups. There were no significant differences in systolic blood pressure during surgery between the groups.

Discussion

We have demonstrated a small (201 ml) but significant decrease in blood loss if the hip replacement operation is performed with the patient in the lateral position. The reason for this phenomenon is not clear. It might be as simple as the fact that raising the surgical field above the heart reduces the blood pressure in the surgical field and thereby reduces venous and arterial oozing. This may be especially important in this type of surgery with considerable microvascular blood loss and where comparatively large surfaces of raw, bleeding cancellous bone are exposed. Modig [5] found a reduction in intraoperative and

postoperative blood loss in patients given continuous lumbar epidural anesthesia during hip replacement. He presumed that the reduction could be explained as a result of lower mean arterial and venous blood pressure. Also, Amaranath [1] showed that intraoperative blood loss increased as systolic blood pressure increased.

Another explanation could be the differences in tissue tension, depending on whether the patient is in supine or laterally positioned (subcutaneous tissue and muscle falling on each side of the incision). However, this is difficult to determine on the basis of the data available.

In conclusion, our investigation shows an advantage in using the lateral position in hip replacement surgery over the supine position in reducing perioperative blood loss.

References

1. Amaranath L, Cascorbi HF, Singh-Amaranath AV, Frankman DB (1975) Relation of anesthesia to total hip replacement and control of blood loss. *Anesth Analg* 54:641–648
2. Hardinge K (1982) The direct lateral approach to the hip. *J Bone Joint Surg [Br]* 64:17–19
3. Ivy AC, Nelson D, Bucher G (1941) The standardization of certain factors in the cutaneous "venous bleeding time technique". *J Lab Clin Med* 26:1812–1822
4. Metha CR, Patel NR, Tsiatis AA (1984) Exact significance testing to establish treatment equivalence for ordered categorical data. *Biometrics* 40:819–825
5. Modig J (1989) Beneficial effects on intraoperative and postoperative blood loss in total hip replacement when performed under lumbar epidural anesthesia. An explanatory study. *Acta Chir Scand Suppl* 550:95–100