Diathermy knife does not reduce bleeding in surgery for primary hip arthroplasty

A prospective randomized study of 67 patients

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We evaluated bleeding in a prospective randomized study of 67 patients undergoing primary hip arthroplasty. In group A, all dissections were made with the diathermy knife and in group B, we used the scalpel. In both groups, bleeding points were coagulated with diathermy. The surgical approach, use of anticoagulants and method of anesthesia were similar in the two groups.

We found that use of a diathermy knife does not significantly reduce bleeding.

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In orthopedic surgery, notably tumor and spinal surgery, it has been a common practice to use a diathermy knife for dissection to reduce bleeding. In breast cancer surgery, Sheen-Chen and Chou (1993) showed that the diathermy knife reduced bleeding more than the scalpel. In hip surgery, such evidence has not been reported.

Therefore we designed this study to compare the use of the scalpel and diathermy knife in hip arthroplasty surgery regarding blood loss.

Patients and methods

27 patients scheduled for total hip replacement (THR) were prospectively randomized by a table of random numbers (Table 1). In Group A, the operation was performed by the use of scalpels and in Group B, we used the diathermy knife (electrosurgical generator Force 40, Valleylab®). A power analysis with a calculated difference of 300 mL blood resulted in a study group of 60 patients. 75 patients were included to compensate for drop-outs.

The inclusion criteria were: no history of bleeding disorders or warfarin medication and no NSAID medication within one week before surgery. The diagnoses were arthroses (n 54), rheumatoid arthritis (n 7) and nonunion of the femoral neck (n 6). In all patients we used the Moore incision, with the patient in lateral position and a cemented Charnley prosthesis (DePuy®). In the diathermy group, the diathermy knife was used for the entire procedure: the skin incision, dissection and coagulation. In the scalpel group, diathermy was used only to coagulate bleeding points. For the skin incision, we chose the mode "pure cut" with a power of 40–75 watts and for the rest of the procedure we used the mode "Blend 1" in the range of 40–100 watts. The mode "pure cut" gives a current that is sinosoidal, creates very little necrosis of the soft tissue and makes a clear-cut but inferior hemostasis. In "Blend 1", the degree of hemostasis is higher, but it causes a larger zone of soft tissue necrosis.

Intraoperative blood loss was monitored by weighing the swabs and measuring the contents of the suction bottles. Postoperatively, the wound was evacuated by one active suction drain (Bellovac®, Ch 14). 24 hours postoperatively, the drain was removed and the postoperative blood loss we found was equal to the amount of drained blood. Blood transfusion was given when the patient developed unstable vital signs or when the hemoglobin concentration was lower than

Table 1. Basic patient data

	Diathermy group n 34	Scalpel group n 33
Arthrosis	26	28
Rheumatoid arthritis	4	3
Old fracture of the femoral neck	4	2
Mean age	69 (38–85)	69 (48–85)
Women/men	22/12	23/10

Table 2. Results

	Diathermy group (n 34)		Scalpel group (n 33)			
	Mean (CI)	Range	Mean (CI)	Range	P-value	Difference (CI)
Blood loss intraop., mL	892 (200)	234–2534	822 (166)	353–2751	0.6 [a]	
Blood loss postop., mL	656 (120)	112–1670	680 (119)	259–1523	0.8 [a]	
Blood loss total, mL	1529 (275)	580–3752	1502 (166)	860–3031	0.9 [a]	27 (317)
Operating time, min	103 (9)	60–194	99 (8)	65–145	0.5 [a]	
Blood transfusion, mL	515 (157)	0–1600	469 (159)	0–1975	0.8 [a]	
Number of patients transfused	25		25		0.4 [b]	

[a] Student's t-test, [b] Mann-Whitney U-test. CI = 95% confidence interval.

80 g/L. Postoperative wound infections were recorded. 2 patients in the diathermy group and 6 in the scalpel group were excluded due to insufficient records. These drop-outs occurred at random.

The Ethics Committee of Karolinska Hospital approved the study.

Statistics

We used the Student's t-test to test differences between the groups and blood losses. Analogous tests were performed on logarithmic values with the same results. The chi-square test was used to compare differences in distribution between the groups.

Results

Although there was no randomization for these parameters, no significant differences were detected in age, gender or diagnosis (Table 1). There was also no significant difference between the two groups as regards operative blood loss or postoperative drained blood. The volume of transfused blood and the number of patients who received a blood transfusion were the same in both groups (Table 2). We had no wound complications or deep infections. In the scalpel group, 1 patient developed a postoperative hematoma, but it did not require treatment.

Discussion

Contrary to popular belief, we found that the diathermy knife did not significantly reduce bleeding. This does not accord with the findings of Sheen-Chen and Chou (1993). The reason for this might be that in hip surgery one mainly cuts through the muscles and joint capsule. These tissues have an abundant blood supply and the rich bleeding from the surfaces is obviously not affected by the diathermy knife. If we had used another mode of electricity to the knife (coagulation instead of cutting), we might have obtained better coagulation. Coagulating incision, however, is not recommended by the manufacturer, since it is thought to increase the degree of tissue necrosis. Diathermy because of its speed and ease of use is better than ligation when it comes to hemostasis of minor bleeding points. Theoretically, it should also reduce operating time and bleeding, if used as a knife, since hemostasis is obtained as a side-effect of the actual dissection and cutting. Our study, however, could not confirm this.

Sheen-Chen S-M, Chou F-F. A comparison between scalpel and electrocautery in modified radical mastectomy. Eur J Surg 1993; 159: 457-9.