THE CLINICAL SIGNIFICANCE OF SUCTION DRAINAGE CULTURES

R. GIRVENT, D. MARTI, J. M. MUÑOZ

A prospective study of 72 operations in which one or more suction drains were inserted, showed that cultures of the drains did not have any predictive value for the development of signs of infection. Protracted suction drainage could, however, increase the risk of postoperative infection.

Keywords : suction drainage ; microbiological culture ; risk of infection.
Mots-clés : drain ; culture bactériologique ; infection.

INTRODUCTION

The use of suction drains is routine practice in orthopedic surgery. Suction drainage aims at reducing the extent of the hematoma in the operative area, thus inhibiting tissue fibrosis and reducing the risk of infection (6). However, there is some controversy about the use of this type of drainage in orthopedic surgery and traumatology (3). In 1978, Browlett *et al.* (2) concluded that their use in simple meniscectomies was not justified. In 1984, Reilly *et al.* (5) showed that their use in knee prosthesis operations did not have any influence on the final result and that, in fact, those patients who did have suction drainage showed an increase in blood loss which then required transfusion. Nevertheless, in our orthopedic practice, drainage is still widely used.

We decided to investigate whether a culture of the tips of the drains could be predictive of the level of contamination or infection of the operation site. A prospective study was made of the cultures obtained from the suction drains in a series of patients.

PATIENTS AND METHODS

We studied 69 patients who underwent a total of 72 surgical procedures on various parts of the body from January to December 1989 (table I). Fifty-one patients (53 surgical procedures) who were scheduled to have a surgical procedure for the insertion of a metallic implant received 2 g cefonicid sodium IV as trade name : Monocid® (SKF, Alcalá de Henares, Spain) (1, 4) within one hour preceding the surgical procedure ; in the remaining 19 surgical procedures, no antibiotic prophylaxis was given.

Table I. — Location and number of surgical procedures

Location of surgical procedure	No.
HIP	51
KNEE	9
SPINE	8
UPPER LIMB	3
LEG	1
Total	72

Drainobag 600 V (B. Braun Inc., Melsungen, Germany) drainage systems were used. They were made of polivinyl chloride (PVC) with an external diameter of 4.7 mm (calibre 14) with holes in the tip. The capacity of the plastic prevacuumed recipient was 600 ml, and the initial vacuum was 300 mm Hg. The suction was initiated in the operating room just after applying the dressing.

Orthopedic Surgery Department, Hospital de Sabadell, Barcelona, Spain.
Correspondence and reprints : J. M. Muñoz-Vives.

The drains were removed when wound effusion was under 20 ml/day, usually between the same day as the surgical procedure and the sixth postoperative day. The removal was carried out under sterile conditions, and the tip was sent to the microbiology laboratory. The transport medium was thioglycolate. In the event of any growth being observed, the culture was transferred to a more adequate medium.

During the postoperative period, work-up was initiated whenever there were any clinical signs of infection of the wound (redness, swelling, increase in the local temperature and exsudation) or the development of fever.

Table II. — Relation between antibiotic prophylaxis and culture results

	Prophylaxis	No prophylaxis
Culture +	23	10
Culture –	30	9

Table III. — Relation between fever and culture results

	Fever	No fever
Culture +	7	24
Culture –	9	32

RESULTS

Thirty-nine cultures were negative and 33 were positive. Among the latter Staphylococcus epidermidis was grown in 20 cases, Staphylococcus aureus in 5, Pseudomanoas aeruginosa in 4, Escherichia coli in 2 and Bacillus spp. and Klebsiella spp. in 1 case each.

Clinical signs indicative of infection were found in 8 of the incisions (redness, swelling, localized increase in temperature, or exudation) ; the remaining 64 showed none of these signs. Of the 8 clinically infected wounds, 2 had negative cultures (25%) and 6 positive cultures (75%), 5 with Staphylococcus spp. and 1 with Klebsiella spp. Of the 64 wounds with no sign of infection, 37 of the drain cultures were negative (58%) and the remaining 27 were positive (42%).

Fifteen (16 surgical procedures) of the 69 patients had fever (> 37.5 C) lasting more than 1 day after the third postoperative day. Of these 16 wounds there were 7 (43%) with positive cultures and 9 (57%) with negative ones. Of the 54 patients who had no fever (56 surgical procedures), 24 (43%) had positive cultures and 32 (53%) were negative.

Fifty-one patients (53 surgical procedures) received antibiotic prophylaxis (2 g cefonicid). The cultures were positive in 23 (43%) of the wounds and negative in 30 (57%) of them. Of the 18 patients (19 surgical procedures) who did not receive any antibiotic prophylaxis, the cultures were positive on 10 occasions (55%) and negative on 9 (43%).

In 36 of the surgical procedures (34 patients) the drainage was withdrawn before 48 hours ; 11 of these patients (12 surgical procedures) (11%) had fever. In the other 36 procedures (35 patients) the drain was left for more than 48 hours ; 4 of these patients (4 procedures) (11%) had fever.

DISCUSSION

Six out of the 8 wounds with signs of infection showed positive cultures ; the other two were negative. Twenty-seven of the wounds without signs of infection had positive cultures (sensitivity = 75%, specificity = 18%).

In 9 of the wounds of the patients with fever the cultures were positive and in 7 they were negative. Twenty-four of the wounds of those patients without fever had positive cultures (sensitivity = 56%, specificity = 27%).

In those patients whose drains were removed after 48 hours, a significantly higher occurrence of fever was shown as compared to those patients whose drains were removed prior to 48 hours ($Chi^2 = 3.937$, $p > 0.05$).

The rate of positive cultures of the tips of the drains is far higher than the 5% found by Willett, *et al.* (7). This could be the result of different culture methods : they cultured the aspirate inside the tip of the suction drainage, while we cultured the tip itself. Willet *et al.* (7) also concluded that the drains should be removed prior to 48 hours since their presence for longer periods of time increases the risk of migration of skin microorganisms along the drainage path. In accordance

with that theory we found that the majority of the germs isolated were skin contaminants (25 of the 33 positive cultures were Staphyloccocus aureus or epidermidis).

CONCLUSIONS

Culture of the suction drains seems to lack both sensitivity and specificity as an indicator of the development of signs of postoperative wound infection.

The drains should be removed prior to 48 hours since their presence for longer periods of time probably increases the risk of migration of skin microorganisms along the drainage path.

REFERENCES

1. Arias J., Feliu M. L., Garcia-Rayo R., Ramos J., Perez-Balcabao I. Profilaxis antibiótica en cirugía ortopédica. Estudio preliminar. *Rev. Ortop. Trauma.*, 1990, 34-IB, 651-655.
2. Browlett J. P., Gibbs A. N., Copeland S. A., Deliss L. J. The use of suction drainage in the operation of meniscectomy. J. Bone Joint Surg., 1978, 60-B, 516-519.
3. Cobb J. P. Why use drains ? J. Bone Joint Surg., 1990, 72-B, 993-995.
4. Garcia S., Lozano M. L., Gatell J. M., Soriano E., Ramo R. Prophylaxis against infection. Single dose cefonicid compared with multiple-dose cefamandole. J. Bone Joint Surg., 1991, 73-A, 1044-1048.
5. Reilly T. J., Gradisar I. A. Jr., Parkan W., Reilly M. The use of postoperative suction drainage in total knee arthroplasty. Clin. Orthop., 1990, 148, 618-620.
6. Waugh T. R., Stinchfield F. E. Suction and drainage in orthopedic wounds. J. Bone Joint Surg., 1961, 43-A, 939-946.
7. Willet K. M., Simmons C. E., Bentley G. The effect of suction drains after total hip replacement. J. Bone Joint Surg., 1988, 70-B, 607-610.

SAMENVATTING

R. GIRVENT, D. MARTI, J. M. MUNOZ. De klinische relevantie van de kweekproef op aspiratieve drains.

Een prospectieve studie van 72 heelkundige ingrepen, waarbij minstens 1 aspiratiedrain gebruik werd, toont aan dat de resultaten van de kweekproeven geen predictieve waarde hebben ivm latere infectietekenen.
Het langdurig ter plaatse laten van een aspiratiedrain kan niettemin het risico van een postoperatieve infectie verhogen.

RÉSUMÉ

R. GIRVENT, D. MARTI, J. M. MUNOZ. Signification clinique de la mise en culture des drains aspiratifs.

L'étude prospective de 72 interventions chirurgicales dans lesquelles fut utilisé au moins un drain aspiratif montre que le résultat de leur mise en culture n'a aucune valeur prédictive pour le développement de signes infectieux.
Le maintien prolongé d'un drain aspiratif pourrait, néanmoins, augmenter le risque d'une infection post-opératoire.