

PERCUTANEOUS PULSED LAVAGE FOR THE INFECTED KNEE REPLACEMENT

A. K. SINGHANIA, N. C. CARRINGTON, C. J. SHAW

The low incidence of infection in knee arthroplasty is in sharp contrast to the high morbidity associated with its occurrence. This lends urgency to the need for early diagnosis and prompt management when infection does appear. To add to the armamentarium of the existing modalities in dealing with this condition, a new technique is described, which allows lavage at high pressure through a minimal access approach. It has been used successfully in two cases, though the follow-up was less than two years. A long-term follow-up will allow us to judge if this technique, used for the correct indications, can promote the longevity of the prosthesis threatened by infection.

Keywords : infection ; total knee replacement ; pulsed lavage.

Mots-clés : infection ; prothèse totale de genou ; lavage pulsé.

INTRODUCTION

The treatment of infection after knee arthroplasty has conventionally been by an initial diagnostic aspiration followed by a formal arthrotomy and debridement, or by arthroscopic lavage. We advocate a minimal access approach, which combines the benefits of using two small incisions, thus avoiding a formal arthrotomy, with the use of pulsed lavage to ensure thorough cleansing by distension-irrigation. It can be combined with arthroscopic debridement. This may be done repeatedly using the same portals to maximise the chances of

retention of the prosthesis with eradication of the infection. A Medline literature review indicates no previous publications on the use of pulsed lavage for sepsis following total knee replacement, though its use during knee arthroplasty is widespread.

TECHNIQUE

Case 1 :

An 80-year-old male patient presented with a history of pyrexia of 39°C, swelling, erythema, pain and reduced movements of the right knee. He had undergone a transurethral resection of the prostate three days previously. He had a history of right total knee replacement performed ten months prior to the urological procedure. On transfer to orthopaedic care the CRP was 497 units/l, ESR 113 mm/hr and white cell count 12800 cells/ μ l, with a mid-stream urine culture growth of 10,000 colonies/ml of beta-haemolytic streptococci, 2 days prior to admission. The patient had received cephadrine orally while under urological care for 2 days following this culture report.

After diagnostic aspiration revealed sero-sanguinous fluid with profuse leucocytes but no organisms, the patient underwent pulsed lavage of the

Department of Orthopaedic Surgery, Hull Royal Infirmary, Anlaby Road, Hull HU3 2JZ, UK

Correspondence and reprints : A. K. Singhanian, Specialist Registrar, Orthopaedics, Diana Princess of Wales Hospital, Grimsby DN 33 2 BA. U.K. E-mail : aloke_singhanian@hotmail.com.



Fig. 1. — High pressure jet of regurgitant fluid during pulsed lavage.



Fig. 2. — Anteromedial and anterolateral portals after closure of incisions.

infected knee. This was done with 5 litres of saline, using anteromedial and anterolateral portals and with the introduction of a wide bore arthroscopic canula to enable drainage of the saline. A high pressure jet of regurgitant fluid (fig. 1) was obtained providing evidence of satisfactory circulation of the lavage fluid within the knee joint. The placement of the outlet canula and the pulse lavage canula was alternated between the tibiofemoral and patellofemoral compartments so as to reach all areas of the joint. The lavage was continued till the regurgitant revealed clear fluid. Incisions were closed using interrupted ethilon sutures (fig. 2). The entire procedure lasted for ten minutes. The patient was started on intravenous cefuroxime post-operatively.

Subsequently, two further washouts were done at intervals of 48 hours. When the patient was discharged he was afebrile and had regained pain free flexion from 0 to 95° with no residual clinical signs of sepsis in the knee. Haematological parameters on discharge were CRP of 77 units/l, ESR of 68 mm/hr and white cell count of 8100 cells/ μ l. Repeated cultures of the knee aspirate, lavage fluid, urine and blood after admission to our care were all negative. Intravenous cefuroxime was converted to oral cephadrine on discharge and continued for 6 weeks. Follow-up at six weeks and three months from discharge showed no deterioration clinically, with the patient maintaining good flexion of the knee. At nine months, the ESR was 26 mm/hr and

CRP 9 units/l. The haematological indices had returned to normal and the patient remained asymptomatic with a good range of motion and a normal radiograph at the eighteen month review.

Case 2 :

A 76-year-old male patient presented two and a half years after a right knee replacement with a history of pain in the knee for two days. He had a temperature of 39.1°C, with only 25° of flexion of the affected knee, though he previously had a range of flexion from 0 to 115°. Clinical examination revealed a hot, swollen knee with an effusion. The leucocyte count was normal, though the CRP was 64.7 units/l. The right knee was aspirated aseptically and initial examination of the aspirate showed Gram-positive cocci. The patient was started on broad spectrum antibiotics. Pulsed lavage was performed on 3 occasions, at 48-hour intervals, as shown (figs. 1 & 2), till the regurgitant fluid was clear. Cultures of the aspirate and blood cultures grew coagulase negative staphylococcus, sensitive to ciprofloxacin and cefuroxime, hence the patient was started on ciprofloxacin. Simultaneous urine examination revealed proteus and group C streptococci, both more than 10⁵ colonies/ml., sensitive to cephadrine and trimethoprim. Cultures of the pulsed lavage fluid from the third wash-out and repeat urine culture at the end of the first week

did not reveal any organisms. The patient was discharged on antibiotics, which were continued for six weeks. At the three-month follow-up appointment, the patient was mobile and bearing his full weight, with a range of flexion from 0 to 110°. The CRP was 3.1 units/litre, with a normal leucocyte count and plasma viscosity. There were no signs of loosening or osteitis on the radiographs. The patient remained asymptomatic at the follow-up at one year after the infection, with no deterioration in function and no abnormality on investigation.

DISCUSSION

Sepsis in the knee has been conventionally treated by formal arthrotomy and debridement (2) or arthroscopic lavage (9, 12), debridement (1), irrigation (3, 7) with or without application of local antibiotics (4). Better results have been demonstrated in acute cases (less than two weeks) by early diagnosis and intervention (11, 13) than in late cases (more than two weeks). In infected knee arthroplasty a good outcome has been reported if intervention is done within 30 days, before any radiographic signs of osteitis or loosening appear (6). While the use of pulsed lavage has been recommended intra-operatively for knee arthroplasty (5), we feel that its use can be extended to the management of the infected knee in conjunction with other modalities discussed above, with beneficial results. The benefits of a minimal access approach include low morbidity, minimal scarring and earlier functional recovery (8, 10).

REFERENCES

1. Flood J. N., Kolarik D. B. Arthroscopic irrigation and debridement of infected total knee arthroplasty ; report of two cases. *Arthroscopy*, 1988, 4, 182-186.
2. Hartman M. B., Fehring T. K., Jordan L., Norton H. J. Periprosthetic knee sepsis. The role of irrigation and debridement. *Clin. Orthop.*, 1991, 273, 113-118.
3. Jackson R. W. The septic knee - arthroscopic treatment. *Arthroscopy*, 1985, 1, 194-197.
4. Jerosch J., Hoffstetter I., Schroder M., Castro W. H. Septic arthritis : arthroscopic management with local antibiotic treatment. *Acta Orthop. Belg.*, 1995, 61, 126-134.

5. Majkowski R. S., Miles A. W., Bannister G. C., Perkins J., Taylor G. J. Bone surface preparation in cemented joint replacement. *J. Bone Joint Surg.*, 1993, 75-B, 459-463.
6. Mont M. A., Waldman B., Banerjee C., Pacheco I. H., Hungerford D. S. Multiple irrigation, debridement, and retention of components in infected knee arthroplasty. *J. Arthroplasty*, 1997, 12, 426-433.
7. Riel K. A., Primbs J., Bernett P. Arthroskopische Uberlaufspuldrainage bei akuter postoperativer Kniegelenkinfektion - Langzeitergebnisse. *Chirurg.*, 1994, 65, 1023-1027.
8. Skyhar M. J., Mubarak S. J. Arthroscopic treatment of septic knees in children. *J. Pediatr. Orthop.*, 1987, 7, 647-651.
9. Smith M. J. Arthroscopic treatment of the septic knee. *Arthroscopy*, 1986, 2, 30-34.
10. Stanitski C. L., Harvell J. C., Fu F. H. Arthroscopy in acute septic knees. Management in pediatric patients. *Clin. Orthop.*, 1989, 241, 209-212.
11. Teeny S. M., Dorr L., Murata G., Conaty P. Treatment of infected knee arthroplasty. Irrigation and debridement versus two-stage re-implantation. *J. Arthroplasty*, 1990, 5, 35-39.
12. Thiery J. A. Arthroscopic drainage in septic arthrides of the knee : a multicenter study. *Arthroscopy*, 1989, 5, 65-69.
13. Wasielewski R. C., Barden R. M., Rosenberg A. G. Results of different surgical procedures on total knee arthroplasty infections. *J. Arthroplasty*, 1996, 11, 931-938.

SAMENVATTING

A. K. SINGHANIA, N. C. CARRINGTON, C. J. SHAW.
Percutane pulse lavage bij geïnfecteerde knieprothese.

De geringe incidentie van infecties bij totale knieprothesen staat in schril contrast met de morbiditeit ervan. De noodzaak van een vroegtijdige diagnose en accurate behandeling is voldoende gekend. Als bijkomende behandelingsmodaliteit beschrijven de auteurs het reinigen van de prothese met behulp van puls lavage via een arthroscopische toegang. Deze techniek werd succesvol aangewend in twee patienten. De follow up is minder dan twee jaar. Een lange termijn follow up is noodzakelijk om aan te tonen dat deze techniek kan bijdragen tot een verlengde levensduur van de prothese alsook tot een verminderde morbiditeit van de patient.

RÉSUMÉ

A. K. SINGHANIA, N. C. CARRINGTON, C. J. SHAW.
Lavage percutané à haute pression dans l'arthroplastie du genou infectée.

La faible incidence de l'infection dans l'arthroplastie du genou contraste avec sa morbidité importante, d'où la nécessité d'un diagnostic et d'un traitement précoces en cas d'infection. Les auteurs proposent une nouvelle technique à ajouter à l'arsenal thérapeutique existant. Elle permet un lavage à haute pression par une incision

a minima. Ils l'ont utilisée avec succès dans deux cas, dont le recul ne dépasse cependant pas deux ans. Un suivi à plus long terme permettra de juger si cette technique permet, dans de bonnes indications, de sauver des prothèses menacées par une infection.