

PEDICLED GASTROCNEMIUS FLAP IN COMPLICATED TOTAL KNEE ARTHROPLASTY

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ABSTRACT

Background and Aims: The aim of this study was to evaluate the results of complicated total knee arthroplasty operations treated with radical wound revision and a pedicled gastrocnemius muscle flap.

Material and Methods: Retrospective analysis in a university hospital during a five-year-period.

Results: Wound revision, debridement of the knee joint, replacing tibial plastics and a unilateral pedicled gastrocnemius muscle flap operation was performed to 10 patients after complicated total knee arthroplasty. After a median follow up time of 11.5 months 8/10 total knee arthroplasty joints were saved.

Conclusions: As much as 80 % of patients could save their knee joint with this treatment protocol. Treatment of this problem needs good collaboration with orthopaedic and plastic surgeons.

Key words: Arthroplasty; complication; gastrocnemius; muscle flap

INTRODUCTION

Successful result after total knee arthroplasty (TKA) abolishes pain, restores ability to walk and decreases the need for daily assistance of the patients. However, when complicated, this procedure can lead to a longer hospital stay, arthrodeses, amputations and even permanent hospitalisation including a vast increase in expenses.

A total of 1644 knee arthroplasties were performed in Kuopio University Hospital (KUH) from 1.1.1996 to 31.12.2000. 244 of them were revision knee arthroplasties. Deep infection and wound rupture complication rate of TKA:s at KUH has been 0.9 % during the last five years.

The local pedicled medial gastrocnemius muscle flap has been used to cover the knee area since 1978

(1). Since then it has been used to cover open fractures, in cancer surgery, wound ruptures, exposed endoprostheses and other complicated wounds around the knee and upper shin areas. It has proven to be a safe, one-stage operation in both acute and chronic problems (2-10). Later this technique has become one of the most popular method of treating exposed endoprosthesis of the knee joint. Not all studies have reported excellent results (5), but still a wide acceptance of this method has developed. The main goals of early revision and reconstruction are avoiding implant replacements, arthrodesis and amputations (6).

The purpose of this study was to evaluate the results of complicated total knee arthroplasty operations treated with a pedicled unilateral gastrocnemius flap in Kuopio University Hospital from 1.1.1996 to 31.12.2000.

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MATERIAL AND METHODS

Through a computerised database system all total knee arthroplasty complications which were treated with wound

revision and a pedicled gastrocnemius flap during 1.1.1996 – 31.12.2000 were included in this study. In all cases a wound revision was performed, a lavation and debridement performed to the knee joint, tibial plastics were replaced and a pedicled unilateral gastrocnemius muscle flap was used to cover the wound. Muscle flap was covered with a split thickness meshed skin graft. A posterior cast was used to prevent knee flexion for three weeks postoperatively. Patient charts were reviewed retrospectively for patient history, surgical procedures and microbiology.

RESULTS

A total of 10 patients were treated with radical wound revision and a pedicled gastrocnemius flap after complicated TKA. Prostheses used are described in Table 1. Complications after primary arthroplasty occurred in 8 patients and in 2 patients after revision arthroplasty. Patients are described in Table 2. Two patients had had both knee joints replaced simultaneously. One patient had a history of oesophageal carcinoma, one patient had rectum carcinoma and one patient had LED. One patient had had a revision operation during the primary hospital stay due to wound necrosis. The median length of stay in hospital after primary operation was 11 days (range 6–25).

Wound healing problem was noted after a median of 14 days (range 3–33 days) after TKA. The problem was firstly noted in health centers (3 patients), local hospital (2 patients), by home nurse service (2 patients) or in a central or university hospital (3 patients). No therapeutic aspiration of knee joint were made at this time nor later. A knee joint lavation system was applied for one patient after 126 days from primary operation. Antibiotic treatment was started to 7 patients before arrival to KUH with a delay of 0–15 days after recognising wound healing problem. Also, 2 patients had had wound revisions performed already prior to transfer to our unit.

The patients arrived in KUH 30 days (mean) after primary operation (range 9–146 days). Wound revision was performed after a median of 33 days (range 21–149) after primary arthroplasty. In two patients wound revision was made first and the muscle flap later in a second operation. The microbiological findings are described in Table 3.

A total of 5 patients needed another operation during the hospital stay after first revision and muscle flap operation. One patient had revision and skin grafting of skin necrosis in the flap donor site and 4 patients local revision and skin grafting around the knee area. The mean length of stay in hospital for revision and flap operation was 15 days (6–30 days).

The follow-up time of patients was 11,4 months (range 5–20). Wound healing was uneventful in 7 patients: their joints were pain free, or they had mild occasional pain, and stable. They walked without crutches and the median range of motion of the knee joint was 2–96° (range 0–110°) at follow-up. One patient needed two hospitalisation periods for wound infections: both were treated by intravenous antimicrobial therapy only.

TABLE 1
Types of prostheses used.

| | N |
|-----------------|---|
| AGC Dual | 1 |
| AMK-Coordinate | 2 |
| Dual Articular | 1 |
| Duracon | 4 |
| Duracon Modular | 1 |
| Nexgen | 1 |

TABLE 2
Patient description.

| | | |
|-------------------------------|----------------------|------|
| Age, yrs (mean) | | 69,7 |
| Sex (N) | female | 7 |
| | male | 3 |
| Indication (N) | osteoarthritis | 6 |
| | rheumatoid arthritis | 4 |
| Previous operation (N) | resection of menisci | 2 |
| | synovectomy | 2 |
| Morbid obesity (N), BMI > 35 | | 2 |
| Smokers (N) | | 0 |
| Corticosteroid medication (N) | | 4 |
| Anticagulative medication (N) | | 1 |

TABLE 3
Bacteriological findings.

| | N |
|------------------------|---|
| Staphylococcus aureus | 4 |
| Klebsiella oxytoca | 2 |
| Enterococcus faecalis | 2 |
| Pseudomonas aeruginosa | 1 |
| Morganella morganii | 1 |
| Peptostreptococcus | 1 |
| Bacteroides fragilis | 1 |

Chronic deep infections occurred in two patients. Both patients were 70-year-old females, who had had 1 previous operation to the operated knee, both were primary arthroplasties. The first patient had the prosthesis removed due to chronic deep infection and an antibiotic spacer was applied. Late fistula development lead finally to femoral amputation at 9 months. This patient had primarily also a total hip endoprosthesis applied in the same operation with the TKA. The other patient needed another local gastrocnemius muscle flap to the same area due to wound infection problem at 9½ months after TKA. This operation was again complicated leading to a revision operation at 10 months and finally to removal of the prosthesis and arthrodesis of the knee joint at 15 months. After this healing was uneventful.

Fig. 1. Perioperative picture of exposed knee prosthesis. Gastrocnemius flap can be seen on the right. Simultaneously a ruptured patellar tendon was reconstructed.



Fig. 2. Muscle flap in place.



Fig. 3. Muscle flap covered with skin graft and wound closed.



Fig. 4. Final result at 11 months postoperatively.



DISCUSSION

The infection and soft tissue problems of the TKA joint may lead to catastrophic situations to the patient. In the most severe problems, wound revision combined with a pedicled gastrocnemius muscle flap is a widely accepted method of treatment. In our material, eight of ten patients treated with this method saved their TKA joint. At follow-up their knees were pain free and functionally acceptable. Corresponding results of this treatment method are published in the literature (5-10).

The time from detecting the wound healing problem to revision and flap operation was surprisingly long. Most complications were noted in either health centres or by home nurses, which are not used to

treating such problems. Wound necrosis without wound rupture does not yet mean an infection problem intra-articularly. Still, early consultations are important to avoid unnecessary delays in necessary treatment procedures.

Wound secretion is a problematic question. The knee area is often oedematous after the operation and this often leads to some secretion of the wound. This phenomena must be separated from purulent secretion due to infection. Clinically it is not easy to differentiate oedema fluid from the possible intra-articular fluid coming through the wound.

In our study no therapeutic knee punctions were performed. There were very few hydropses. This reflects the problem being more a wound healing problem than an intra-articular problem. This again is an

indication for early wound debridement. It is essential to remove dead or infected tissue before a skin/subcutaneous problem becomes an intra-articular one. Hence bacterial colonisation of the knee joint and of the endoprosthesis itself can be avoided.

Obviously, the pedicled gastrocnemius muscle flap must be used only in situations, where the salvation of the knee joint is likely. In cases of severe intra-articular infection, the prostheses must be removed, and if possible, the flap should be left available to cover future re-arthroplasties or arthrodesis.

As much as 8/10 patients could save their knee joint with this treatment protocol. Treating complicated arthroplasty wounds is challenging and needs good collaboration with orthopaedic and plastic surgeons.

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