Case report

Cemented modular intramedullary nail in failed knee arthroplasty—a report of 2 cases

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In cases with infected knee arthroplasty having bone destruction, severe instability or deformity or a deficient extensor mechanism, arthrodesis can be considered. External fixation has a success rate of 21–99 % (Brodersoen et al. 1979, Knutson et al. 1984, Rand 1993), but soft tissue problems like pin-track infection are common complications. It is also difficult to obtain stability, especially in patients with osteoporosis or bone loss (Damron and MacBeath 1995).

Intramedullary nailing with a long nail from the trochanteric region is often reported as more successful (Knutson et al. 1985, Wilde and Stearns 1989, Donley et al. 1991). It is easier to obtain stability, but migration, intraoperative fracture, neurovascular injury and breakage of the nail have occurred (Puranen et al. 1990).

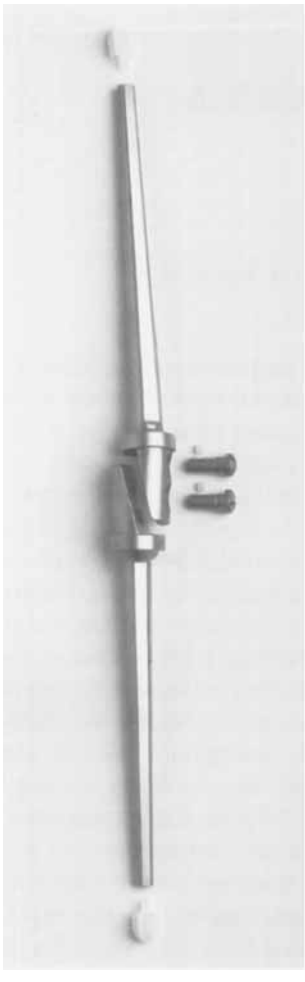
Arroyo et al. (1997) reported 16 cases of tumors and 5 cases of failed total knee arthroplasty treated with a modular titanium uncemented intramedullary nail which was inserted through a single-knee incision and coupled at the level of the knee joint. Fusion was achieved in 19 patients. I report our department's experience with a similar device: a custom-made stainless steel modular nail for cement fixation.

Case 1

A 64-year-old woman with a replaced hip on the right side was operated on with a total knee replacement on the same side because of arthrosis. 1 month later, a deep infection was diagnosed and *Enterococcus faecium* sensitive only to vancomycin was cultured from the joint. The prosthesis was extracted and much bone had to be removed. During the operation, it was decided to make an arthrodesis and a single Hoffmann frame was mounted. Vancomycin was administered intravenously. 10 days later, a new revision and autologous bone grafting were performed and an anterior external fixator was added. After 4 months, the two frames were extracted because of loosening and an orthosis was used for 3 months. She was then readmitted because of instability and increasing pain. There were no signs of infection and the sedimentation rate was normal. We decided to use a stainless steel modular device for intramedullary cement fixation (Artrodesenagel; Waldemar Link Hamburg, Germany) (Figure). Fibrous tissue was resected, the intramedullary cavities were plugged and filled with bone cement (Palacos cum Gentamicin) loaded with vancomycin. The nail was introduced retrogradely into the femur and antegradely into the tibia. After the cement had cured, the nail was coupled and fixed with two screws. Bone chips from the iliac crest were transplanted around the coupled part of the nail. Postoperatively, full weight-bearing was allowed. After 4 months, the bones united (Figure).

Case 2

A 62-year-old woman was operated on with a unicondylar knee prosthesis because of arthrosis. After 1 year, there were signs of prosthetic infection, but cultures of joint fluid were negative. A two-step revision to a bicondylar prosthesis was performed. Cultures of tissue samples were still negative. After 6 months, there were still clinical signs of infection. The prosthesis was extracted and gentamicin beads were placed in the joint space. Tissue samples now revealed coagulase negative staphylococcus, sensitive to gentamicin and vancomycin only. Because of severe obesity, arthrodesis with a long intramedullary nail was considered too difficult and instead the Artrodesenagel was used. The patient was operated as in case 1. After 4 months, her sedimentation rate was normal and bony union had occurred (Figure).



Artrodesenagel with the coupled mid-section.

Case 1. AP view of knee arthrodesis with Artrodesenagel.

Case 2. Lateral view of knee arthrodesis with Artrodesenagel.

Discussion

Engelbrecht et al. (1985) reported their experience from the Endo-Klinik with a cement-fixated "Artrodesenagel"; 12 patients with knee prosthetic infection were treated with good results. In cases of failed knee arthroplasty when arthrodesis is considered, a cemented modular intramedullary nail seems to be a good alternative, especially in patients with hip arthroplasty.

It is easy to use. In case of infection, the cement can be loaded with antibiotics according to the cultures. This has already proved beneficial in total hip revision surgery (Josefsson et al. 1981). The cement gives immediate stability; it is not so easy to obtain immediate stability with an uncemented device or external fixation. Bone transplantation can be performed and leg length can be adjusted to some extent.

Arroyo J E, Ganini, K L, Neff J R. Arthrodesis of the knee with a modular titanium intramedullary nail. J Bone Joint Surg (Am) 1997; 79: 26-35.

Brodersoen M P, Fitzgerald R M, Jr, Peterson I F A, Coventry, M B, Bryan R S. Arthrodesis of the knee following failed total knee arthroplasty. J Bone Joint Surg (Am) 1979; 61: 181-5.

Damron T A, McBeath A A. Arthrodesis following failed total knee arthroplasty: comprehensive review and meta-analysis of recent literature. Ortopedics 1995; 18: 361-8.

Donley B G, Mattews L S, Kaufer H. Arthrodesis of the knee with an intramedullary nail. J Bone and Joint Surg (Am) 1991; 73: 905-13.

Engelbrecht E, Heinert K, Keller A. Interpositionsnagel bei diaphysären Knochen-defekten und Arthrodesenagel bei gescheiterten Kniegelelenksersatz. Chirurg. 1985; 56: 712-7.

Josefsson G, Lindberg L, Wiklander B. Systemic antiobiotics and gentamicin-containing bone cement in the prophylaxis of postoperative infections in total hip arthroplasty. Clin Orthop 1981; 159: 194-200.

Knutson K, Hovelius L, Lindstrand A, Lidgren L. Arthrodesis after failed knee arthroplasty. A nationwide multicenter investigation of 91 cases. Clin Orthop 1984; 191: 202-11.

Knutson K, Lindstrand A, Lidgren L. Arthrodesis for failed knee arthroplasty. A report of 20 cases. J Bone and Joint Surg (Br) 1985; 67 (1): 47-52.

Puranen J, Kortelainen P, Jalovaara P. Arthrodesis of the knee with intramedullary nail fixation. J Bone Joint Surg (Am) 1990; 72: 433-42.

Rand J A. Instructional course lecture. Alternatives to reimplantation for salvage of the total knee arthroplasty complicated by infection. J Bone Joint Surg (Am) 1993; 75: 282-9.

Wilde A H, Stearns K L. Intramedullary fixation for arthrodesis of the knee after infected total knee arthroplasty. Clin Orthop 1989; 248: 87-92.