

MEGA PROSTHETIC KNEE REPLACEMENT FOR TREATMENT OF RESISTANT DISTAL FEMORAL NON UNION

Raju Vaishya* and Rohit Hasija**

*Senior Consultant, **Senior Registrar, Department of Orthopaedics & Joint Replacement Surgery, Indraprastha Apollo Hospitals, Sarita Vihar, New Delhi 110 076, India.

Correspondence to: Dr Raju Vaishya, Senior Consultant, Department of Orthopaedics & Joint Replacement Surgery, Indraprastha Apollo Hospitals, Sarita Vihar, New Delhi 110 076, India.

The incidence of non-union in distal femoral fractures has been reported from 0 to 13%. Treatment of these fractures has always been challenging and there is still no established consensus on ideal treatment of non-union of such fractures. Preservation of knee function and early weight bearing should be the objectives of management to have best clinical outcome. We report treatment of three cases of distal femoral fractures which had failed to unite despite prior internal fixation with a distal femoral tumor endoprosthesis (megaprosthesis) originally developed for use in musculoskeletal tumor surgery as a treatment option as an alternative to internal fixation. The Knee Society Score increased from 35 to 78 & Knee Society Function Score increased from 5 to 80 in these patients. Our patients had good range of motion (70-90 degree flexion) at 8 months of follow up and were walking pain free without the need of any ambulatory support. We thus conclude that cemented Megaprosthesis appears to be a viable one time treatment solution for failed internal fixation of distal femoral fractures, associated with distal femoral bone loss and secondary knee arthritis with or without ligamentous instability in elderly patients.

Key words: Distal femoral fracture nonunion, Megaprosthesis knee replacement.

INTRODUCTION

NONUNIONS of supracondylar distal femoral fractures seem to be rare and the incidence reported ranges from 0 to 13% in various studies [1-5]. Treatment options in such non-unions include repeated open reduction and internal fixation attempt, knee arthrodesis, or Prosthetic replacement. In young patients with relatively good bone stock, revision open reduction and internal fixation is preferred. For elderly patients with osteoporosis and poor bone stock, prosthetic replacement is a good option. Although salvage of these problems with total knee arthroplasty (TKA) has been recognized as a therapeutic option, there have been few reports on its efficacy [6,7].

We present 3 elderly patients, illustrating the successful use of Total Knee Arthroplasty Megaprosthesis in previously operated resistant non-union of long duration of Supracondylar Femur fracture, with significant bone loss of femoral condyles & secondary knee arthritis.

CASE 1

A 60-year old female presented to us with complaints of pain in the knee and inability to walk without support ever since when she was operated upon elsewhere. She had undergone Dynamic Condylar Screw for supracondylar

fracture 3 years back. On examination, her knee was grossly unstable (esp. medio-laterally) and she had 10 deg of flexion deformity. Her range of motion was from 10-80 deg. X-ray was suggestive of non-union at fracture site with osteopenia and severe osteoarthritis changes. There was resorption of lateral femoral condyle. Her pre-operative Knee Society Score was 34 and Knee Society Function Score was 5. Because of her resistant nonunion, poor bone stock and severe osteoarthritis change; we did cemented total knee arthroplasty using Howmedica Modular Reconstruction System (HMRS) prosthesis, as a one stage solution for a complex problem.

CASE 2

A 50-year-old male sustained supracondylar fracture along with proximal tibia fracture 7 years back. He was operated by Dynamic Condylar Screw and bone grafting for distal femur and Open reduction and internal fixation using screws for proximal tibia. On radiological examination, proximal tibia had malunion resulting in a deformity in his leg; however distal femur nonunion persisted with severe bone loss in form of loss of lateral femoral condyle. There was also evidence of severe post-traumatic arthritis of the knee joint. She had loss of terminal extension of 20 degrees and her range of motion was 20-90 degrees with valgus deformity at knee. His pre-

operative Knee Society Score was 28 and Knee Society Function Score was 0.

She could not bear weight on the affected limb and was treated with total knee arthroplasty using Howmedica Modular Reconstruction System (HMRS) prosthesis.

CASE 3

A fifty-four-year male sustained Road Traffic Accident 2 yrs ago and sustained compound comminuted fractures of distal femur & proximal tibia. He was treated by debridement & ext fixator, followed by ORIF of distal femur, using a DCS. The DCS failed & he presented to us with nonunion with implant failure 1 yr ago. Reosteosynthesis of distal femur was done using DFN+ BG, but it failed again & now he presented to us with shortening of 5cms, stiff knee and inability to bear weight. X-ray films showed a loose backed out screw, nonunion of distal femur, bone loss in Lateral Femoral Condyle and severe arthritis of knee. His pre-operative Knee Society Score was 42 and Knee Society Function Score was 10.

The diseased Distal femur (about 14 cms), just proximal to nonunion was excised and replaced by megaprosthesis.

OPERATIVE TECHNIQUE

Thorough pre-operative planning was done and necessary blood & radiological investigations were done to rule out any evidence of active infection.

After taking informed consent, in both the patients, previous skin incision on lateral aspect of thigh was used and this was curved anteriorly at knee to become midline distally.

Previous hardware was removed and the femur was cut with an oscillating saw at the level proximal to the nonunion with good quality of bone. The proximal end of the resected femur was held with a bone holding forceps & further dissection is carefully done distal wards towards the knee, taking a due care of neurovascular structures. In all cases dense thick fibrosis was encountered all around the femur, which led to difficult & laboured exposure.

In all the patients, the stems were cemented into place because of the availability of good cancellous bone proximal to the nonunion. Intraoperative and immediate postoperative period was uneventful in all the 3 cases. Postoperatively, the patients immediately began range-of-motion exercises and weight bearing as tolerated.

RESULTS

Patients were followed regularly at 2 wks, 6 wks, 3

mths, 6 mths and 8 mths. Last follow up visit was at 8 months post-operatively. At that time all patients were pain free and could walk full weight bearing without support.

Patient 1 had pre operative Knee Society Score of 34 which increased to 88 and The Knee Society Function Score of 5 which increased to 80 at 8 months post-operatively. Her range of motion was 0-100 degrees.

Patient 2 had pre operative Knee Society Score of 27 which improved to 70 and The Knee Society Function Score of 0 which increased to 70 at 8 months post-operatively. His range of motion was 0-100 degrees.

Patient 3 had pre operative Knee Society Score of 42 which improved to 80 and The Knee Society Function Score of 10 which increased to 90 at 6 months post-operatively. His range of motion was 0-90 degrees.

All patients were satisfied with their results.

DISCUSSION

Non union of supracondylar fractures is not an uncommon problem, despite using internal fixation with standard operative fixation methods, like blade plate, condylar screw & plate, distal femoral nails etc. Nonunion is more common in elderly patients & is usually associated with secondary knee arthritis, poor bone stock, bone loss in femoral condyles, knee stiffness, ligamentous instabilities & deformity. Hence, it is often quite challenging to treat these patients with multiple local problems around the affected knee joint. Previous studies evaluating the outcome of Total Knee Arthroplasty for distal femoral nonunion documented mixed results, with many associated complications. Haidukewych *et al.* [8] reported good results after total knee arthroplasty for salvage of failed internal fixation or nonunions in 17 patients. Freedman *et al.* [7] reported excellent results with total knee replacement in five elderly patients with acute fracture or nonunion in osteopenic bone with gonarthrosis.

Excision of diseased bone of distal femur in these patients is often difficult due to previous multiples scars of surgery, & difficult exposure (due to dense & thick fibrosis). The proximal resection of femur & subsequent dissection distally is preferable & safe, as one can avoid neurovascular injuries.

The use of Megaprosthesis in such complex problem, esp in elderly patient, addresses all these issues in a single stage procedure. It provides stable & well aligned knee, which provides useful and painfree range of motion and restores the limb length to some extent. However, it is

cautioned that leg length of more than 2" should not be attempted to correct in one stage, as it might lead to abnormal stretching of neurovascular structures. Megaprotheses of the knee is well tolerated, permits early ambulation & return to activities of daily living [6]. Kress *et al.* [9] reported excellent results in nine patients using custom total knee arthroplasty with press fit intramedullary stems in the treatment of juxta-articular nonunions. We are convinced that the megaprotheses of knee can be a valuable armamentarium of the reconstructive knee surgeon who treats complex non unions of distal femur with associated problems of arthritis & bone loss etc, & where other reconstructive procedures cannot be performed.

Although distal femoral megaprosthesis has been designed & customarily used for limb salvage for reconstruction after tumor excision. The long term results of these prosthesis after tumor excision have been reported as good, with a survivorship of 90% at 10 years [10]. The use of these knee prostheses in non tumorous condition has only been reported as 2 case reports in distal femoral non union [6]. However, Parvizi & Franklin [11] have reported 21 cases of successful proximal femoral replacements with megaprotheses in non tumorous conditions & found that been mode of failure of these megaprotheses is similar in patients with or without neoplastic conditions. Hence, it can also be applied the same logic to the knee megaprotheses, however its long term results are still not documented. Further clinical data are needed to evaluate the durability of this technique.

CONCLUSION

Despite the operative challenges, HMRS Megaprosthesis can address the bone deficiency of any degree in these cases, similar to tumor resection cases. Severely limited patients experienced marked improvement in pain and functional capacity, which are the hallmarks of this successful salvage procedure.

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