INTRODUCTION
The long-term survival of patients even with malignant bone tumours has increased through advances in adjuvant chemo and radio therapy.1,2 Now limb salvage can be performed in 85 - 95% of patients with bone tumours.2,3 The functional as well as cosmetic results are satisfying after reconstruction with modular tumour prostheses or massive allografts, composite allografts, or vascularised fibula grafts.3-5 However, the complication rate of allografts implantation and endoprosthetic replacement is 13 - 25%.4 Infection associated with prosthesis is common and serious complication. Re-infection after revision surgery is very high and about 20% of revision surgery lead to amputation.4,6 Patient may require multiple surgeries and sometimes surgeon is left with no option but secondary amputation or hip disarticulation.

We report a case of multiple failed surgeries in a patient with distal femoral giant cell tumour (GCT) where limb was salvaged by a simple and cost-effective method of straight-plasty.

CASE REPORT
A 35 years old female presented with chief complaint of pain, swelling and gaping of wound over the lateral side of the thigh showing the cement spacer. There was erythema, tenderness and raised local temperature. There was no neurovascular involvement and the foot was sensate with normal ankle and toe functions. Review of records of previous surgeries revealed that patient had a large giant cell tumour of the distal end of right femur. Wide excision and limb reconstruction with mega prosthesis was performed. Postoperatively, she developed an overwhelming infection at surgical site and around the prosthesis. The patient underwent another surgery at the same institute, where debridement was done and the antibiotic impregnated beads were put along side the prosthesis (Figure 1). The infection, however, persisted. Third operation was performed, where antibiotic beads along with the infected knee prosthesis were removed and an antibiotic cement coated nail spacer was inserted (Figure 2). After few days, spiral fracture occurred in the subtrochanteric area which was treated with circlage wires but the nail cut through the bone and the cement spacer got exposed through the lateral aspect of the thigh (Figure 3).

Then patient consulted our orthopaedic oncology clinic. Various options of treatment like amputation through the upper thigh, removal of spacer and Ilizarov bone transport, and rotation-plasty were explained to the patient and the family with pros and cons of each method. They were shown the videos and photographs of the patients treated with rotation-plasty. The patient and the family did not agree to the procedure of rotation-plasty; instead requested to keep the shortened limb with foot facing forward and not to rotate the leg 180 degrees. Surgery was performed; the nail spacer was removed along with the infection loaded part of distal thigh and femur up to the subtrochanteric area and a part of proximal infected tibia except for the neurovascular bundle i.e. femoro-popliteal vessels and the sciatic nerve with its two major branches; the tibial and lateral popliteal nerves (Figure 4). A trough was made in the proximal tibia and the subtrochanteric part of femur was compacted in this trough without rotation and we termed this procedure as straight-plasty instead of the standard rotation-plasty and an intra-medullary nail was used to stabilise the construct.
The postoperative period was uneventful. Femoro-tibial union occurred in 4 months. The patient is using extension prosthesis and doing her all indoor house routine work along with the sense of preserved foot and is well satisfied with the outcome. On a follow-up of 3 years, she is doing well (Figure 5).

DISCUSSION

Infection associated with tumour prostheses is a common and serious complication in the reconstruction of large bone defects. However, there is paucity of literature on definitive outcome after the infection and guidelines for its management. Limb salvage surgery should be performed whenever possible, but not at the cost of inadequate margins. Rotation-plasty, or shortening of the leg with rotation of 180 degrees to allow the ankle to function as a knee joint, is an established dependable and durable alternative to above-the-knee amputation for the treatment of malignant tumours of the knee. Rotation-plasty is one of the procedures performed to save a limb with persistent infections in endoprosthesis. It may also be undertaken after failure of endoprosthetic replacement of the distal femur.

The patients with rotation-plasty are more active, have a more efficient gait, and are capable of faster free walking speeds than those who have had either an above knee amputation or a knee arthrodesis. The function after an above-knee amputation or disarticulation of the hip depends on a bulky prosthesis and is inferior to that which is achieved after rotation-plasty. Amputation should be performed only if the patient refuses rotation-plasty or in the presence of unfavourable local conditions such as neurovascular damage or extensive chronic infection. The energy consumption is less after rotation-plasty and patients can walk faster than after above-knee amputation or disarticulation of the hip. The sensate foot tolerates and fits better in the socket of the prosthesis resulting in proper load bearing on the prosthesis than a stump. Prosthesis required is shorter than after an above-knee amputation, thus decreasing weight and leading to better gait with conservation of energy.
In this patient, the distal part of the leg and foot was saved with a shortening of nearly 15 inches as compared to the opposite normal limb. As patient was not willing for fixation of distal foot and leg in rotation due to belief that rotated leg is ghosts, hence, we kept the leg and foot in neutral position after intermediate stump resection (straight-plasty). Although the patient lost the advantage of using ankle as knee joint as achieved in described rotation-plasty, but she had the advantage of preservation of proprioception in foot and ankle, psychological satisfaction of salvaged foot (better than hip disarticulation or mid thigh amputation) and relatively easy prosthetic fitting. Moreover, there was no risk of complications associated with amputation like bony spur formation, phantom sensations, neuroma formation and skin ulceration. Further prosthetic fitting may prove difficult after very high amputation in the lower limb. Straight-plasty does present a strange cosmetic picture but she had not expressed any regret after the surgery.

This case report describes alternative partial limb salvage, using straight-plasty which can be performed in primary tumours and those with persistent uncontrolled infection after a failed limb salvage procedures especially in patients who detest rotation-plasty due to religious or superstitious reasons.

REFERENCES