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Pirogoff Amputation in Forefoot and Midfoot Crush Injury as Staged Procedure: A Case Report

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Abstract

We present a case of crush injury of fore foot and mid foot due to run over by four-wheeler in a road traffic accident in a 63-year-old male patient. During the third sitting, Pirogoff amputation was performed using cannulated cancellous screws for tibiocalcaneal fusion. The wound had marginal necrosis on the 6thday and skin loss; hence, skin graft was planned, which was carried out on the 21st post-operative day. Follow-up visit at 6months shows minimal loss of limb length and satisfactory functional results in gait. He did not require any walking aid to walk for shorter distance. At 1-year follow-up visit, the patient developed discharging sinus and lysis around the screw site; hence, implant removal was done. Wound healing was delayed up to 4 weeks. The patient was put on weight relieving calipers till then. After the wound healed, the patient was asked to bear weight. It can be considered as the treatment of choice for foot injuries where forefoot and midfoot cannot be reconstructed. Delayed presentation with implant loosening should be considered.

Keywords: Cannulated cancellous screws, Crush injury, Tibiocalcaneal fusion, Skin graft.

Introduction

Pirogoff amputation was described by Nicolas Pirogoff, a greatest Russian surgeon[1,2,3,4,5]. The calcaneal fragment was fused to tibia and heel flap was firmly fixed in place by fusion [2], resulting in a stable [3,6] and end-bearing stump [1], with possibility of full weight-bearing [4], which was longer than [1] and had higher mobility than Symes [4,6] hence better than Symes [4,7,8].

Case Report

A 62-year year-old male sustained crush injury of the left foot where forefoot and part of midfoot were amputated during injury. Moderate contamination was present. The patient was taken for the emergency debridement after which only talus, calcaneus and cuboid were retained in the foot (Fig. 1a). For one week of negative pressure, wound therapy was applied till until the wound was suitable for further intervention. In the second sitting, talus and cuboid were excised. Again negative pressure, wound therapy was applied (Fig. 1b) and cuboid resection.

After a week interval, Pirogoff amputation was executed. The patient was positioned supine on a radiolucent operating table. Tourniquet was not used. As there was no forefoot or mid foot during the third sitting of staged surgery, incision could not be marked. The skin remnant was just distal to tip of medial malleolus and calcaneocuboid joint anteriorly, heel skin was intact. The talar empty space was opened. The anterior, middle, and posterior talar articular surface of the calcaneums were exposed. Oblique osteotomy was carried in the following manner. Initially, vertical osteotomy was carried out just behind the anterior talar articular surface. Using oscillating saw, the distal end of this osteotomy was taken as distal point for oblique osteotomy proximal point being the posterior border of the upper end of the calcaneums forming around 60° degree with horizontal (Fig. 2a). The distal end of the tibia was osteotomized just proximal to subchondral level perpendicular to the shaft, with medial and lateral malleolus along the line of tibia (Fig. 2b, 2 and c). Two guide wires were inserted through the calcaneusm into tibia under image intensifier in crossed manner. Two 6.5mm cannulated cancellous partially threaded screw were passed over guide wire after drilling. The threads being in the tibia only to achieve adequate compression hence used as lag screw. The distal and proximal skin remnant was approximated with non-absorbable suture material (Fig. 2d). Sterile dressing was applied over petroleum gauze.

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Figure 1: (a) Image of the left foot after debridement,(b) image of the left foot after talectomy and cuboid resection.

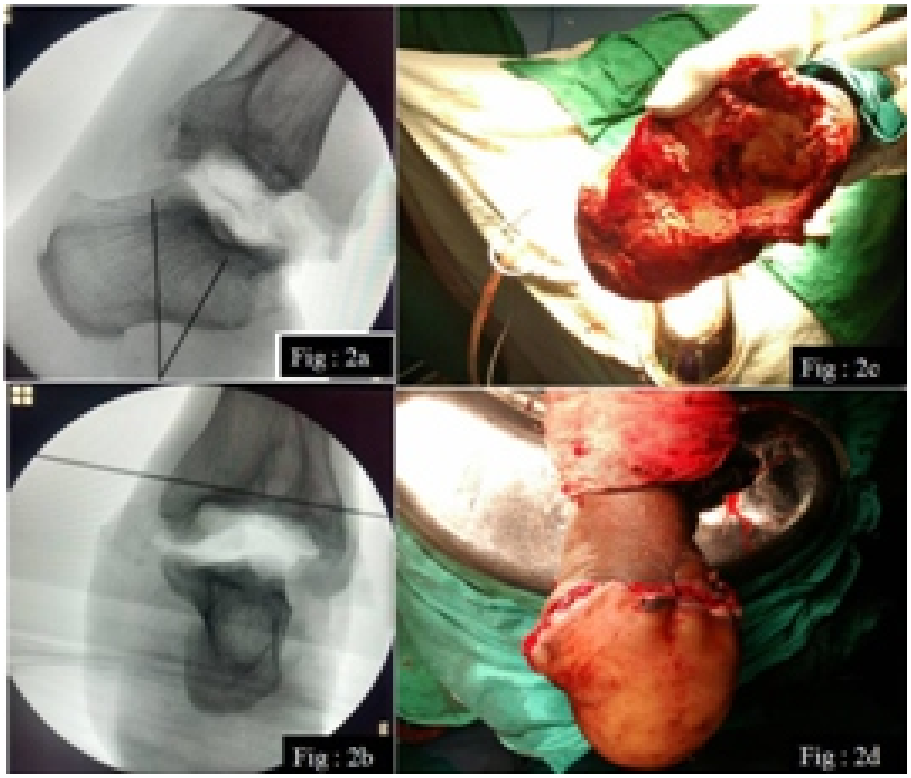

Figure 2: (a) C-arm image of proposed calcaneus resection level,(b) C-arm image of proposed tibial resection level,(c) intraoperative image after calcaneus and tibial cut,(d) intraoperative image after wound closure.

Compression bandage was applied. The wound had marginal necrosis on sixth the 6th day and skin loss; hence, skin graft was planned, which was carried out on the 21st post-operative day. The graft site healed uneventfully. The patient was allowed complete weight-bearing from the second 2nd month onwards.

Initially with walker assisted. He did not require any walking aid to walk for shorter distance. X-rays were taken post post-operative (Fig.3a,3b) and during follow-up (Fig. 3c, 3d). There was minimal limb length discrepancy (Fig.3e). Modified ankle and hind foot score was 5. There was no phantom limb sensation.

At one 1-year follow-up visit, the patient had osteolysis around the screw site (Fig. 4a,4b) and discharging sinus around lateral malleolar site. The culture came as sterile. Implant removal was done by taking incision over heel and under image intensifier (Fig.4c,4d). Wound healing was delayed up to 4 weeks. The patient was put on weight relieving calipers till then. After the wound healed, the patient was asked to bear weight.

Figure 3: (a) Post-operative X-ray image lateral view,(b) post-operative X-ray image anteroposterior view,(c) 3-monthfollow-up X-ray image lateral view,(d) 3-monthfollow-up X-ray image anteroposterior view,(e) image showing minimal limb length discrepancy.

Discussion

Pirogoff amputation was described by Nicolas Pirogoff, a greatest Russian surgeon[1,2,3,4,5]. The calcaneal fragment was fused to tibia and heel flap was firmly fixed in place by fusion[2], resulting in astable[3,6] and end-bearing stump[1] with possibility of full weight-bearing[4], which was longer than[1] and had higher mobility compared to Symes[3,6] hence better than Symes[4,7,8]. Other advantages are less loss of limb length[3,4,8], no prosthesis is necessary to compensate for the shortening[1,9], malleoli are left in place; hence, prosthesis is more rotationally stable [4] and more

Figure 4: (a) One-year follow-up X-ray image lateral view showing lysis around screw,(b) 1-year follow-up X-ray image anteroposterior view showing lysis around screw,(c) X-ray image lateral view after implant removal,(d) X-ray image anteroposterior view after implant removal.

anatomical [3] and also there is reduced risk of pressure ulceration [8], overall, it has minimal energy loss when walking [8], reduced level of physical strain (difference is <2cm) [7] gives rapid recovery and return to functional mobility [8]. It has reduced level of complications as Symes or transtibial amputation [8], better than Chopart's amputation (as Chopart's amputation causes foot drop)[3,7,8]. Most of the articles have been published for diabetic foot. Few have done it for traumatic foot. Einsiedelet al. [2] reported six cases of trauma treated by Pirogoff's amputation. Ipaktchiet al. [6] presented the case of a bilateral traumatic lower leg amputee whose management included a Pirogoff amputation. Den Bakker et al. [8], in 2010, reviewed 10 articles, in which they found that of 60 patients who underwent Pirogoff's amputation,13were due to trauma and reported one case of Pirogoff's amputation following trauma. Rijkenand Raaymakers [9] reported six cases of trauma treated by Pirogoff's amputation and had satisfactory results. Gessmannet al. [10] performed Pirogoff amputation in four patients with crush injuries of the foot. In our case of traumatic foot, we had good results with Pirogoff's amputation.

Conclusion

Pirogoff's amputation can be considered as the treatment of choice for foot injuries where fore foot and mid foot cannot be reconstructed. Delayed presentation with implant loosening should be considered.

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