The Pirogoff Amputation: Literature Review and Prospective Case Series Involving Diabetic Foot Patients.

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The authors’ have no potential conflicts of interest to declare in conducting this study.
Introduction

- **Aim:** To assess the outcomes of Pirogoff amputation for diabetic foot amputations in patients with intact posterior tibial pulses
- **Hypothesis:** The Pirogoff amputation has good outcomes for diabetic foot amputations
- **Rationale:**
  - The Pirogoff amputation involves the removal of the forefoot and talus followed by calcaneotibial arthrodesis.
  - This produces a lower extremity with a minimal loss of length that is capable of bearing full weight.
Literature Review

- Literature review was conducted using these keywords
  - “foot amputations”
  - “Pirogoff”
  - “diabetic foot”
  - “foot trauma”

- 11 articles were found before being further narrowed down to 3 relevant articles

**Summary:**
- The Pirogoff amputation has been successfully described for patients with trauma, leprosy and malignancy involving the forefoot.
- Paucity of literature on the Pirogoff amputation in diabetic foot lesions.
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<th>Title</th>
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| Pirogoff amputation for foot trauma: an unusual amputation level     | den Bakker et al JBJS 2010| 1                  | Trauma     | *Case report of 1 patient who had amputation due to trauma. Literature review:*  
  *Of the sixty patients, thirteen (22%) had the amputation due to trauma. Complications with a Pirogoff amputation included*  
  - reamputation at a higher level due to infection (n = 8, 13%)  
  - revision of the amputation stump including necrectomy and skin grafting (n = 3, 5%)  
  - early failure due to pain and an associated inability to use the limb (n = 11, 18%),  
  - leg-length discrepancy exceeding 3 cm (n = 1, 2%).  
  *All patients with a fair or poor result on Taniguchi rating scale were dysvascular amputees, and five of them subsequently underwent a transtibial amputation.* |
| Lower limb salvage using Pirogoff ankle arthrodesis: minimally invasive and effective fixation with the Ilizarov external ring fixator. | Einsiedel T Orthopade 2008 | 6                  | Trauma     | *Outcome was measured with a modified ankle disarticulation score*  
  - Four cases with good or excellent outcomes  
  - Two cases (33%) with initially successful arthrodeses required transtibial reamputations due to secondary infection.  
  - No delayed union or nonunion of the arthrodeses in the study  
  - Median followup of 45.8 months                                                                                           |
| The modified Pirogoff amputation for traumatic partial foot amputations | Riiken et al Eur J Surg 1995 | 6                  | Trauma     | *All 6 patients were satisfied with their stumps at follow up (7 months–13 years).*  
  - None had stump pain or phantom pain  
  - They were able to ambulate indoors without prosthesis.  
  - Pirogoff amputation is recommended as the treatment of choice for partial traumatic amputation as about 5 cm of the sole of the foot can be preserved.* |
Methodology

Inclusion criteria:
- positive posterior tibialis artery pulse on doppler ultrasound
- premorbidly ambulant without walking aid
- healthy skin and soft tissue over the midfoot and hindfoot
- no radiological evidence of osteomyelitis involving the calcaneous or midfoot

Informed consent was obtained from the 6 patients with gangrene involving the forefoot
- 5 Male, 1 Female
- Mean age of 55.2 years (range: 31–63 years)

Investigations pre-operatively:
- Biochemical investigations to monitor diabetic control: HbA1c and serum glucose levels.
  - Mean pre-operative HbA1c was 11.4% (range: 10.0–16.0%).
- Ankle and foot radiographs
- ankle–brachial index and arterial duplex ultrasound
  - 3 patients had triphasic waveforms posterior tibial artery waveforms
  - 3 others had biphasic posterior tibialis artery waveforms.

Endocrinologists’ review was done daily for all patients to optimise peri-operative glycaemic control.
Figure 1: Disarticulation of the talus

Figure 2: Midfoot amputation

Figure 3: Forefoot amputation

Figure 4: Calcaneotibial arthrodesis with K–wire fixation
Results

- The Pirogoff stump had poor healing with stump breakdown and necrosis despite good peri-operative glycaemic control and strict aseptic wound care.

- All 6 patients had failed Pirogoff amputations and subsequently required a higher amputation.
  - 4 patients required below knee amputation
  - 1 required through knee amputation
  - 1 patient required above knee amputation

- The prospective study was aborted after 6 patients in view of the high failure rate associated with this operation.
Conclusion

- In our experience, the Pirogoff amputation is associated with a high failure rate in patients with diabetes despite a positive posterior tibialis pulse on ultrasound Doppler, viable soft tissue cover and optimised peri-operative diabetic control and wound care.

- Previous studies indicate that a viable posterior tibialis pulse is important for the success of this surgery as the heel is supplied extensively by it. Patients with trauma to the forefoot but a preserved posterior tibialis pulse had a high success rate with the Piragoff amputation.

- Diabetes is a microvascular as well as a macrovascular disease. The Piragoff amputation may not be a viable option for diabetic patients with forefoot lesions due to other pathological processes affecting wound healing in these patients.
References


