Syme Amputation in the Setting of Severe Vascular and Renal Insufficiency– A Case Series

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Introduction/Purpose

In patient populations with severe cardiovascular and renal insufficiency, a BKA may preclude patients from ever walking again, which can shorten lifespan.[1] Syme amputations require less rehabilitation and can achieve improved levels of functional independence compared to below knee amputation (BKA). Syme amputations have a decreased metabolic cost of walking, as well as ability to bear weight on the amputation stump for transfers. This has a major impact on patients with multiple advanced comorbidities.[2] Syme amputations are underutilized due to fear of stump failure, difficulty fitting a prosthesis, and heel migration.[3,4] These complications are rarely seen in transtibial amputations. The 2-year mortality rate for transtibial amputations is greater than 30%.[5] In this patient population, the Syme amputation is an effective procedure for gangrene or infection. This case series reviews 22 cases of Syme amputations in a population with severe vascular and renal insufficiency.

Methodology

We retrospectively reviewed 21 patients (22 limbs) who underwent Syme amputation from 2012-2019 by a single surgeon at our institution due to infection, necrosis, or extensive soft tissue deficits. Mortality, use of prosthesis, and the necessity of additional procedures was reviewed.

Syme amputation was performed either using the traditional posterior buried heel flap or with alternative soft tissue flaps. Alternative Syme amputation flaps were performed specifically when partial calcanectomy was previously performed. Given the partial calcanectomy is typically performed in the setting of posterior heel ulceration, the calcaneal heel pad is unavailable for Syme amputation closure. Antibiotics were given based on culture results and infectious disease recommendations. Vascular intervention was provided when deemed appropriate.

Post operatively all patients were made NWB and placed in a total contact cast by a prosthetist. At the time of suture removal patients could begin ambulation with a brace fashioned by the prosthetist.

Results

21 patients and 22 total limbs were retrospectively reviewed with all 21 patients meeting the inclusion criteria of surviving at least 1 month. Average age was 69 years old with a range of 47 to 87. The average follow up was 10.7 months with a range of 0.25 to 42 months. 60% of patients still survived at time of review. Of the patients that died, the average time to death after Syme amputation was 1.6 years. 77% of patients were able to avoid proximal amputation at time of final follow up. 62% of the patients who survived and avoided proximal amputation are ambulating in a prosthetic.

Table 1: Patient outcome data after Syme amputation.

Patients	21
Limbs	22
Age (range) years	68.6 (47-87)
Follow up (range) months	10.7 (0.25-42)
Percent deceased at time of review	8/21 (38%)
Average time to death after Symes	1.6 years
Conversion to transtibial amputation	5/22 (22%)
In prosthetic	8/13 (61%)
DM	15
CKD	11
PAD	20

Discussion and Literature Review

Our results reflect the current literature on survivability and transition to prosthesis. A retrospective review of 55 Syme traumatic and atraumatic amputations performed by Finkler *et al.* showed that the patients with diabetes mellitus died 51% of the time. They also found that 12.1% of their diabetic patients converted to proximal amputation.[6] A systematic review by Braaksma *et al*. showed that patients with vascular disease after Syme amputation converted to a higher level of amputation 23% of the time (n=483) and were able to ambulate in a prosthesis 69% of the time (n=196).[3] Despite the high mortality rate of these comorbid populations, of the patients that survive, the rate of fitting into a prosthetic is relatively high.

A unique quality of our cohort is that it contains patients that have undergone the traditional two staged heel pad utilization and an alternative closure Syme amputation. Patients with an alternative closure had heel pad destruction from heel ulcer and subsequently failed subtotal calcanectomy. The patients who underwent alternative Syme closure and survived were able to obtain a prosthesis 50% of the time. These findings are comparable to the current literature on alternative Syme closure. In a retrospective review of 10 Syme amputations in which the posterior heel flap was unusable or destroyed, 4 patients were able to walk with a prosthesis with satisfactory function.[7]

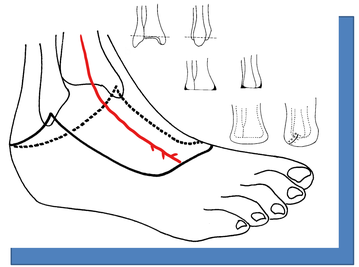

Figure 1: Syme amputation with dorsal flap.[7]

Figure 2: Syme amputation with fitted prosthetic.[8]

Conclusion

In general, the potential Syme amputation population is a very sick one. In our cohort there was a large number of vasculopaths (>90%). These patients tend to be sicker and have high rates of concomitant diabetes mellitus, renal disease, and are generally more frail. The fragility of these patients can be a barrier to rehabilitation of a BKA. Thus, it is imperative that more aggressive attempts at limb salvage are pursued. In addition, we have presented a limb salvage option in the form of an alternative closure Syme in patients who have a destroyed heel pad.

Figure 3: Syme amputation with fitted prosthetic.

References

1. Taylor SM, et al. Preoperative clinical factors predict postoperative functional outcomes after major lower limb amputation: an analysis of 553 consecutive patients. J Vasc Surg. 2005 Aug;42(2):227-35.
2. Pinzur MS, Wolf B, Havey RM. Walking pattern of midfoot and ankle disarticulation amputees. Foot Ankle Int. 1997 Oct;18(10):635-8.
3. Braaksma R, Dijkstra PU, Geertzen JHB. Syme Amputation: A Systematic Review. Foot Ankle Int. 2018 Mar;39(3):284-291.
4. Bibbo C. Modification of the Syme amputation to prevent postoperative heel pad migration. J Foot Ankle Surg. 2013 Nov-Dec;52(6):766-70. doi: 10.1053/j.jfas.2013.07.006. Epub 2013 Sep 7.
5. Pinzur MS, Gold J, Schwartz D, Gross N. Energy demands for walking in dysvascular amputees as related to the level of amputation. Orthopedics. 1992 Sep;15(9):1033-6; discussion 1036-7.
6. Finkler ES, et al. Long-term Outcomes Following Syme's Amputation. Foot Ankle Int. 2017 Jul;38(7):732-735. doi: 10.1177/1071100717702462. Epub 2017 Apr 11.
7. Robinson KP. Disarticulation at the ankle using an anterior flap. A preliminary report. J Bone Joint Surg Br. 1999 Jul;81(4):617-20.
8. Crowe, CS, et al. Prosthetic and orthotic options for lower extremity amputation and reconstruction. Plast Aesthet Res. 2019;6:4.