Abstract
Heterotopic ossification (HO) is excess bone growth in soft tissues, typically juxta-articular and intermuscular, with varying incidence. HO has been well documented in traumatic amputees but less frequently observed in the non-traumatic amputee population. Symptomatic HO usually includes pain during prosthetic use, with management involving prosthetic adjustments for comfort. This atypical case highlights a non-traumatic amputee developing proximal oriented large spur formation that was painful with ambulation but with doffing of his prosthesis.

Case Description
A 58 year old gentleman with a history of atrial fibrillation on coumadin and peripheral vascular disease presented to an emergency room in Italy in June 2015 with shortness of breath. The patient was in acute respiratory failure requiring intubation and mechanical ventilation and prolonged vasopressor support for septic shock. He required 15 days of extracorporeal membrane oxygenation for support as his respiratory function improved with antibiotics. After weaning off vasopressors, both lower extremities were found to be hyperperfused, requiring a right transfemoral amputation and a left transfemoral amputation. The left lower extremity required an additional debridement for surgical site infection and a prolonged antibiotics course. He then returned to the United States in September 2015. The patient had inpatient pre-prosthetic training in September 2015 and inpatient prosthetic training in February 2016, demonstrating proficiency and independence in ambulation and activities of daily living with his prostheses. At that time, he did not have any atypical pain, nor was there any evidence of heterotopic ossification.

The patient was highly active with his tight fitting prostheses. However, he began to complain of severe pain in the left residual limb, not with weight bearing, but only when he removed his residual limb from his socket. Upon his follow up appointment with his prosthetist, an X-ray was ordered which revealed a 3.9 x 2.3cm calcified lesion at the medial aspect of the femoral shaft of his residual left femur. This heterotopic spur was oriented proximally. He was referred to plastic surgery, who removed the spur and noted that the spur had a significant blood supply. Post-operatively, the patient was pain free and continued to be active with his prostheses.

Heterotopic Ossification
Heterotopic ossification (HO) is excess bone growth in soft tissues. Typically it develops outside the borders of normal periosteum and has its own vascular supply [1]. It can be contiguous with the periosteum of the residual limb. Release of the sciatic nerve as well as adjustments to her prosthetic socket were not helpful in relieving the magnitude of her limp pain. Surgical excision was performed 18 after amputation with significant relief of her pain along with increased functional use of the prosthetic. The second was a 59-year-old man who also underwent a left transfemoral amputation after a traumatic injury. Radiographic examination at 6 months post-amputation revealed a bone growth along the femoral shaft extending from the amputation site to adjacent soft tissues. Release of the sciatic nerve as well as adjustments to her prosthetic socket were not helpful in relieving the magnitude of her limp pain. Surgical excision was performed 18 after amputation with significant relief of her pain along with increased functional use of the prosthetic.

Discussion
The pathophysiology of HO is not very well described in the literature. It is thought to be due to the transformation of dormant osteogenic progenitor cells into osteoblasts, leading to bone formation [3]. Various humoral, neural, and local factors must come together to create the necessary environment for HO to occur [7]. When the periosteum covering bone that is retained is stripped, ectopic bone formation can occur [8]. This results in the formation of a simple bone spur. However, when this case is unique is the extension of the bony growth into adjacent soft tissue as well as its irregular shape. An extensive literature review revealed only one case report of heterotopic ossification in the residual lower limb in an adult non-traumatic amputee [9]. To our knowledge, heterotopic ossification in an adult non-traumatic amputee is a rare occurrence. In this case, the patient presented with pain with doffing of the prosthesis along with his proximal orientation of his heterotopic spur, appear to be unique.

Conclusion
Heterotopic ossification can be a pain generator in adult, non-traumatic amputees. Further, it remains to be determined whether the pathogenesis differs between traumatic and non-traumatic amputee populations.

References
1. Straver JW, W.J., Johnson EW, Am J Phys Med 175 PD, amputees. When the HJ, amputation. The left lower extremity required an additional debridement for surgical site infection and a prolonged antibiotics course. He then returned to the United States in September 2015. The patient had inpatient pre-prosthetic training in September 2015 and inpatient prosthetic training in February 2016, demonstrating proficiency and independence in amputation and activities of daily living with his amputations. At that time, he did not have any atypical pain, nor was there any evidence of heterotopic ossification.

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