Utility of Targeted Muscle Reinnervation to Reduce Postoperative Pain in Patients Undergoing Hindquarter Resections

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INTRODUCTION:

Pre-emptive targeted muscle reinnervation (TMR) at the time of upper extremity amputation results in less phantom limb pain (PLP) and residual limb pain compared with untreated amputee controls. However, there is limited literature describing the technique in patients undergoing hindquarter amputation despite up to 90% of these patients reporting PLP and 50% presenting with painful neuroma. The purpose of the current study was to (1) perform an anatomic study to locate motor nerves accessible through a primary hindquarter amputation to be used for TMR and (2) review pain outcomes in clinical case correlates of patients with TMR.

METHODS:

Six limbs were obtained from three fresh adult cadavers without previous lower limb surgery or trauma. Sensory and motor nerves were dissected and available motor entry points were recorded. In addition, we reviewed records of patients undergoing hindquarter amputation with TMR.

RESULTS:

Following cadaveric dissection we proposed the following transfers during a hindquarter amputation: the femoral nerve is coapted to the psoas muscle branches from the lumbar plexus or to the femoral motor branch to the iliacus; the sciatic nerve is coapted to the inferior gluteal nerve branches to the gluteus maximus; and the obturator nerve is coapted to one of the motor branches to the gluteus medius from the superior gluteal nerve or to the adductor longus branches in the setting of a hip disarticulation.

Two patients who underwent external hemipelvectomy and one patient who underwent hip disarticulation with TMR were reviewed (Table 1, Figure 1). Following surgery patients were taking narcotic and neuroleptic pain medication for a mean of 30 days (range 5-50 days) and 207 days (range 0-406 days). At most recent follow-up, no patient reported debilitating phantom pain nor pain associated with neuromas.

DISCUSSION AND CONCLUSION:

Our study describes technical options for pre-emptive TMR in the case of hindquarter amputation with supporting clinical cases. Pre-emptive TMR should be considered as an option at the time of surgery for these patients to limit PLP, neuroma pain and dependence on pain medications.

Figure 1:

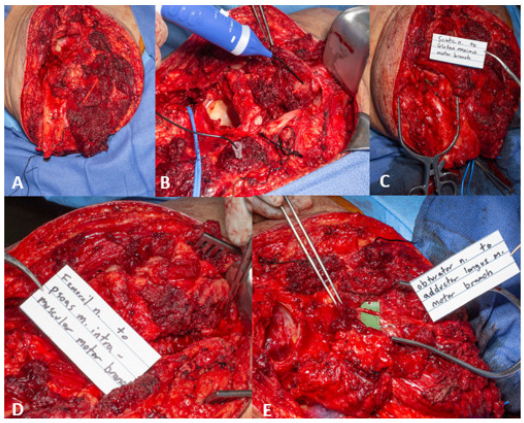

Figure 1: During hip disarticulation the major nerves are tagged for easy identification (A). A nerve stimulator (B) is then used to identify motor nerves in surrounding muscle. The sciatic nerve is coaptated to the gluteal nerve motor branches (C), femoral nerve to the motor nerves of the psoas (D) and obturator nerve to the adductor motor branches (E).

Table 1: Patients Undergoing Hindquarter Amputation with Targeted Muscle Reinnervation

Patient	Age	Diagnosis	Surgery	Time to D/C Narcotics	Time to D/C Neuroleptics
1	15 Years	Osteosarcoma	External Hemipelvectomy	50 Days	407 Days
2	79 Years	Chondrosarcoma	External Hemipelvectomy	34 Days	217 Days
3	77 Years	Metastatic Renal Cell Carcinoma	Hip Disarticulation	5 Days	Never Took