Effects of Hip Arthroscopy Without a Perineal Post on Venous Blood Flow, Muscle Damage, Peripheral Nerve Conduction & Perineal Injury: A Prospective Study

K. Linnea Welton, MD,

Tigran Garabekyan, MD, Matthew J. Kraeutler, MD, Lara A Vogel-Abernathie, MD, Daniel Raible PhD, Jesse A Goodrich, BA, and Omer Mei-Dan, MD

ISHA 2019 - Madrid, Spain

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DISCLOSURES

- None

Background

- Hip arthroscopy is an elective procedure
  - Typically performed on young, healthy, active individuals
  - Minimizing complications is important

- Rate of complications reported as around 1.5%[1-4]
  - Prospective ongoing study reports 25% incidence[5]

- Many transient neuropraxias, urologic dysfunction, sexual dysfunction, soft tissue tears/necrosis associated with use of a perineal post[6-9]

Background

- Several studies have monitored changes to lower extremity nerve conduction, vascular flow and soft tissue injury[10-12]
  - Methods of hip distraction in each utilized a perineal post

- All studies showed >50% of hip scopes performed resulted in significant alterations of conduction in peripheral nerve branches of sciatic nerve
  - Martin et al[10] also demonstrated significant reduction in venous blood flow and increased markers of vascular and soft tissue injury

Study Objective

- Hip arthroscopy performed without a perineal post – as described by Mei-Dan et al[13] could potentially mitigate some of these preventable complications

- **Purpose of this study – to evaluate effects of postless hip arthroscopy on lower extremity venous blood flow, nerve conduction, muscle tissue damage, and perineal injury**

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Methods

- Prospective, nonrandomized case series
  - Modeled after study by Martin et al[10]
- 40 adult hips enrolled
  - Exclusion of anyone with peripheral vascular disease, peripheral neuropathy, preoperative statin use, h/o substance abuse or psychologic disturbance
- Blood Work:
  - CPK-MM and D-Dimer obtained preoperatively, immediately postoperatively and at 7 – 12 days postoperatively

Methods

- Doppler Ultrasonography:
  - CFV and popliteal vein measured in operative and non-operative legs after anesthetic induction, Trendelenburg positioning, initiation of traction, 30 minutes intervals, after traction released and recovery room
- SSEP and TcMEP:
  - SSEPs measured continuously throughout procedure
  - TcMEPs measured after anesthetic induction, Trendelenburg positioning, initiation of traction, 30 minutes intervals, after traction released and at skin closure

Results

- 40 hip arthroscopies: 5 bilateral simultaneous procedures and 8 involved patients who underwent PAO ~ 1 week later
- Average age was 32.3 years, 40% males
- Average traction time was 73.5 minutes
- Average traction force of 69.2 lbs

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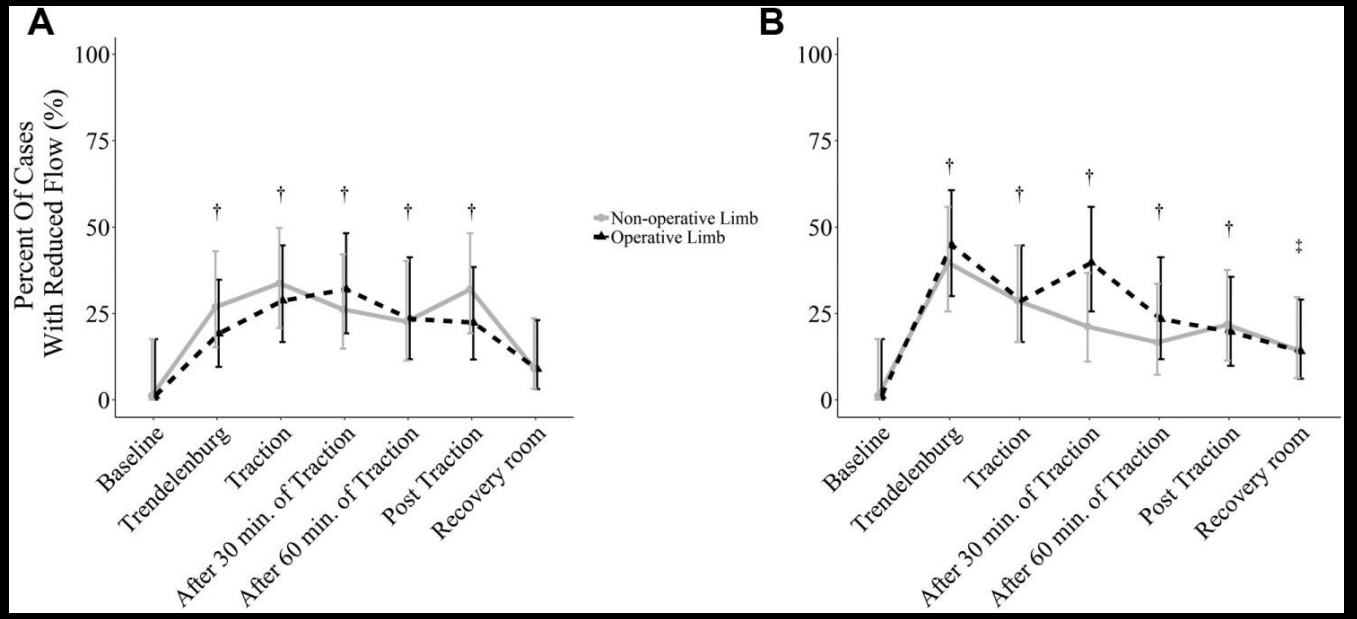
Results – Doppler Ultrasonography



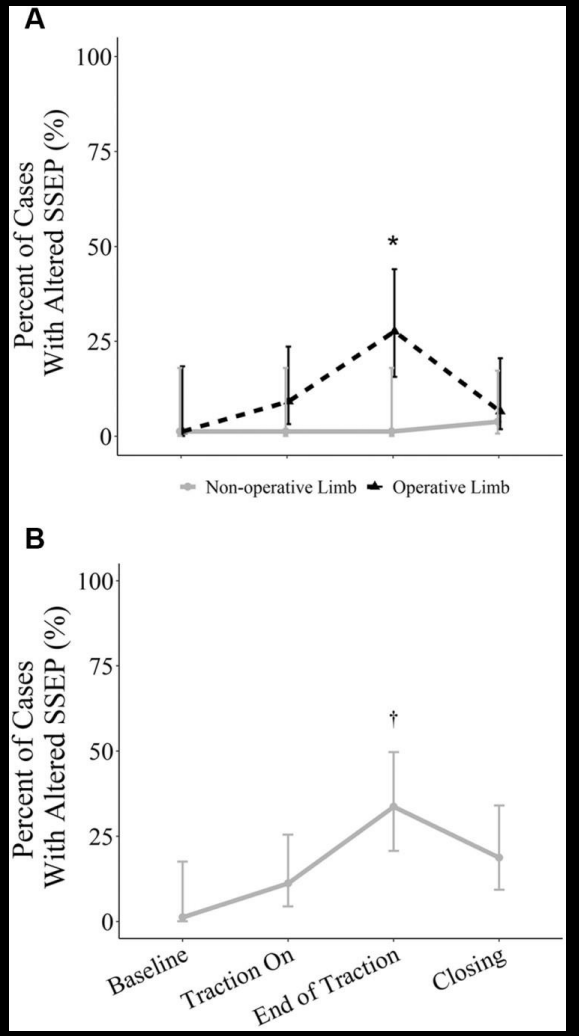
- No cases of complete venous occlusion
- No significant differences between operative and non-operative leg – whether traction was applied or not
- Reduction in flow seen after placement into Trendelenburg, no significant increase once traction applied
  - No significant difference from baseline post-operatively

Results – SSEP Monitoring

- No significant differences in SSEPs in non-operative limb for duration of case
- Trend in operative limb of decrease in SPN SSEP from time traction was applied to just before removed (90.8% to 72.4%, P = 0.09)
- By skin closure 95% of SSEPs of SPN returned to baseline

SPN – out of boot

PTN – in boot

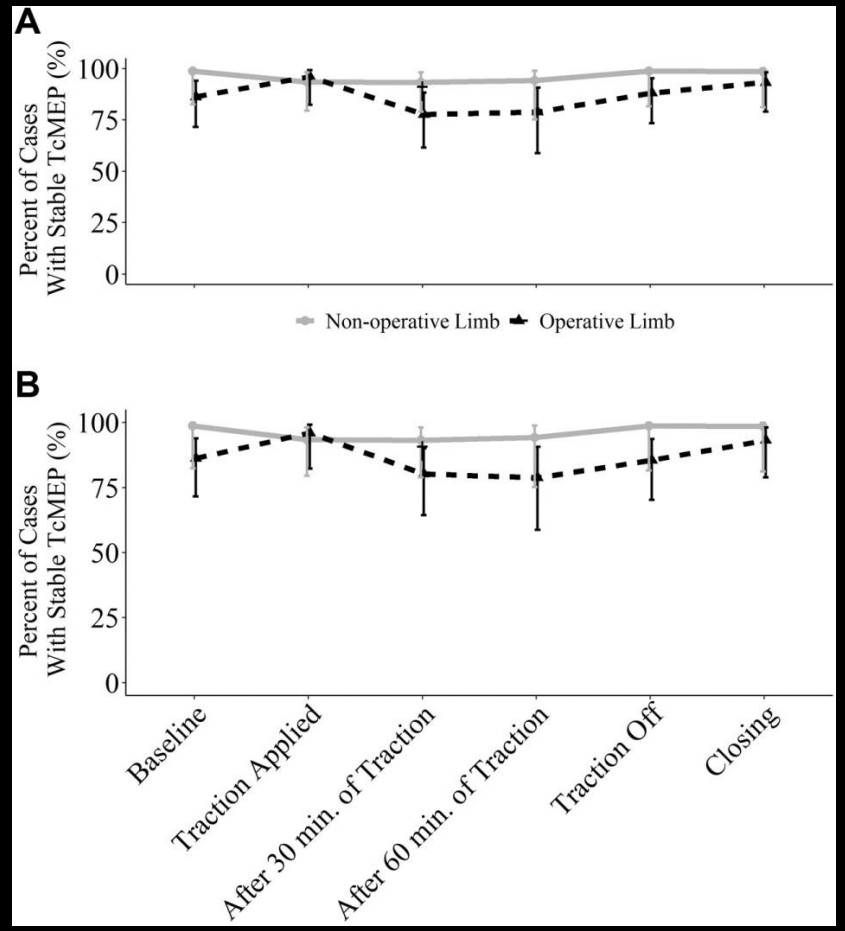


Results - TcMEP Monitoring

- Muscles outside Traction Boots:
  - No significant changes for duration of case
  - No significant differences between operative and non-operative limbs
  - > 90% of all muscles measured at each time point were normal

Tibialis anterior

Gastrocnemius



Results – Blood Work CPK–MM

- Average CPK-MM levels preoperatively, immediately post-operatively and 7 -12 days after were 112 IU/L, 90 IU/L, and 102 IU/L (normal 0 – 156 IU/L)
- As percentage of patients with abnormal values – 4% preoperatively, 22.5% immediately post-operatively, 20.5% remain elevated 7 – 12 days after
  - Secondary analysis – patients who **underwent bilateral simultaneous hip arthroscopy** were more likely to exhibit elevated CPK levels (OR 22.5, P = .02)

Results – Blood Work D-dimer

- Average D-dimer levels preoperatively, immediately postoperatively, and 7 – 12 days after were 0.29 µg/mL FEU, 0.47 µg/mL FEU, and 0.68 µg/mL FEU (normal < 0.5 0.29 µg/mL FEU)

- Preoperatively 4% of patients had abnormal D-dimer values
  - No significant increase at immediate post-operative 11.9%, $P > 0.1$
  - Significant increase at 7 – 12 days after surgery, 55.7% $P < 0.01$)

- No significant relationship found between elevated D-dimer levels and significant venous flow reduction seen during surgery with Doppler Ultrasonography.

Results

- No patients were clinically diagnosed with DVT
- No soft tissue or groin-related complications were seen immediately after surgery or at follow-up

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Discussion

- First study to perioperatively evaluate nerve, vascular, and soft tissue injury arising from hip distraction with a postless surgical bed

- Modeled after study by Martin et al[10]
  - We studied 2 x number of subjects for vascular- and nerve-related datea
  - We measured Doppler ultrasonography of the popliteal vein and CFV more frequently
  - Measured SSEPs continuously and added TcMEPs

Discussion

- Average CPK-MM values higher preoperatively in our study compared to Martin et al[10]
  - CPK-MM values more immediately postoperatively in Martin et al's study (190 IU/L vs 232 IU/L)
  - Both studies showed reduction into normal range at final follow-up (102 IU/L vs 138 IU/L)
  - *Minimal soft tissue injury despite our traction times being nearly 3 x longer than in study by Martin et al[10] (73.5 min vs 27.3 min)*
- D-dimer values positive in higher percentage of patients in Martin et al's study[10]
  - No patients diagnosed with DVT

Discussion

- Martin et al[10] reported complete occlusion 100% time in popliteal vein and reduced flow CFV in 27% cases after traction was applied
  - No instances of complete occlusion in our study
  - Reduced flow in 53.8% of popliteal vein and 38.5% of CFV

  - *Difference between compression post places on thigh vs physiologic reduction in venous filling seen when patients are placed in the Trendelenburg position[14]*

Discussion

- SSEPs of SPN in operative limbs similarly affected in our study compared to that of Martin et al[10] (21.6% vs 20%)
- Differences in non-operative limb neuromonitoring
  - No SPN signal changes and only 38.5% of posterior tibial nerve compared to 33.3% and 53.5% in study by Martin et al
  - *Potentially highlights negative affects perineal post has on even non-operative side*

Conclusion

- Postless hip arthroscopy is safe
  - Without notable reduction of venous blood flow or alteration of nerve function
  - Muscle tissue damage is subclinical, transient, and reduced compared with distraction using a post

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Thank you

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