

Early Detection, Better Outcomes: Screening Lower Leg Ischemia in Total Knee Surgical Patients

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Introduction

Prior to this project, OCOM Hospital did not have consistent, standardized screenings to assess vascular compromise post total knee surgical procedure. This created delays in identifying circulatory compromise and often completed only after symptoms appeared.

Ankle-Brachial Index (ABI) is an established diagnostic tool for vascular compromise and can be used to assess clinical findings in acute limb ischemia (ALI).¹

ABI is a quick and noninvasive tool for assessing vascular status of the lower extremity. ABI is the ratio between systolic blood pressure of the lower extremity (ankle) and the upper extremity (brachial).

$$ABI = \frac{\text{Systolic Blood Pressure at Ankle}}{\text{Systolic Blood Pressure at Arm}}$$

Although lack of published guidelines on using ABI specifically for this process, we believe this may be key to assessing vascular compromise and early intervention in post total knee replacement surgical procedures.

Research Question

Does implementing an ABI protocol for total knee arthroplasty patients detect early acute limb ischemia?

Can early intervention prevent permanent damage from a vascular compromised leg?

Study

ABI Protocol Initiated (October 2022)

- Pre-Op checks dorsalis pedis pulse and marks site. If unable to palpate, use doppler. If doppler used, obtain and document oscillometric ABI. Notify physician before surgery.
- PACU performs oscillometric ABI on every post operative total knee patient. If ABI is <0.90, verify with 2nd nurse, if outcome is the same or have concerns- notify physician immediately.
- PSU will perform neurovascular and pulse checks q1h x4, q4h until discharge. Notify physician of abnormal findings.

ABI Protocol Update (September 2023)

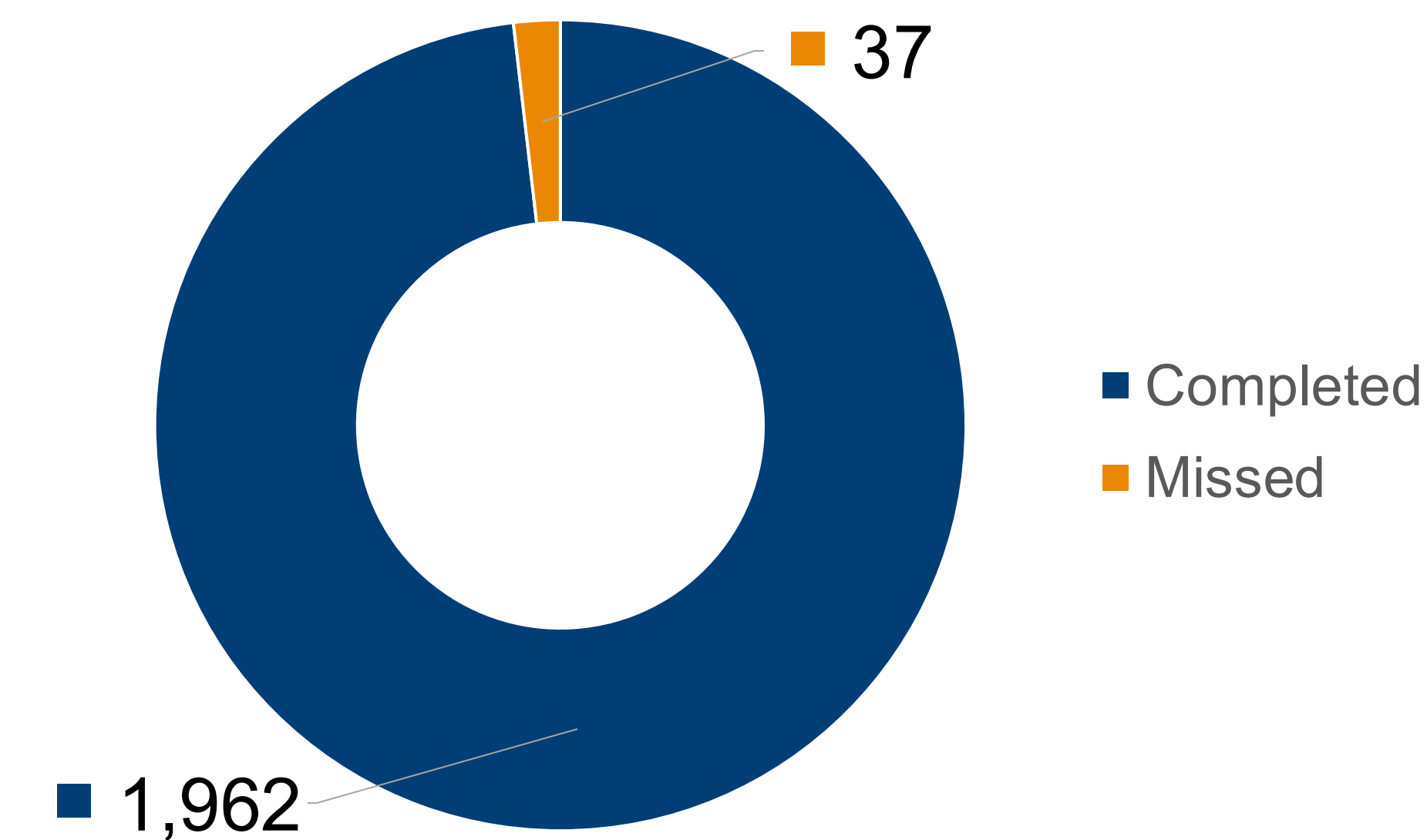
- Pre-Op checks oscillometric ABI on every preoperative total knee patients. If ABI is <0.90, verify with 2nd nurse, if outcome is the same or have concerns- notify physician immediately.
 - This allows physician to make an informed decision if vascular consult needed.

ABI Protocol Update (January 2025)

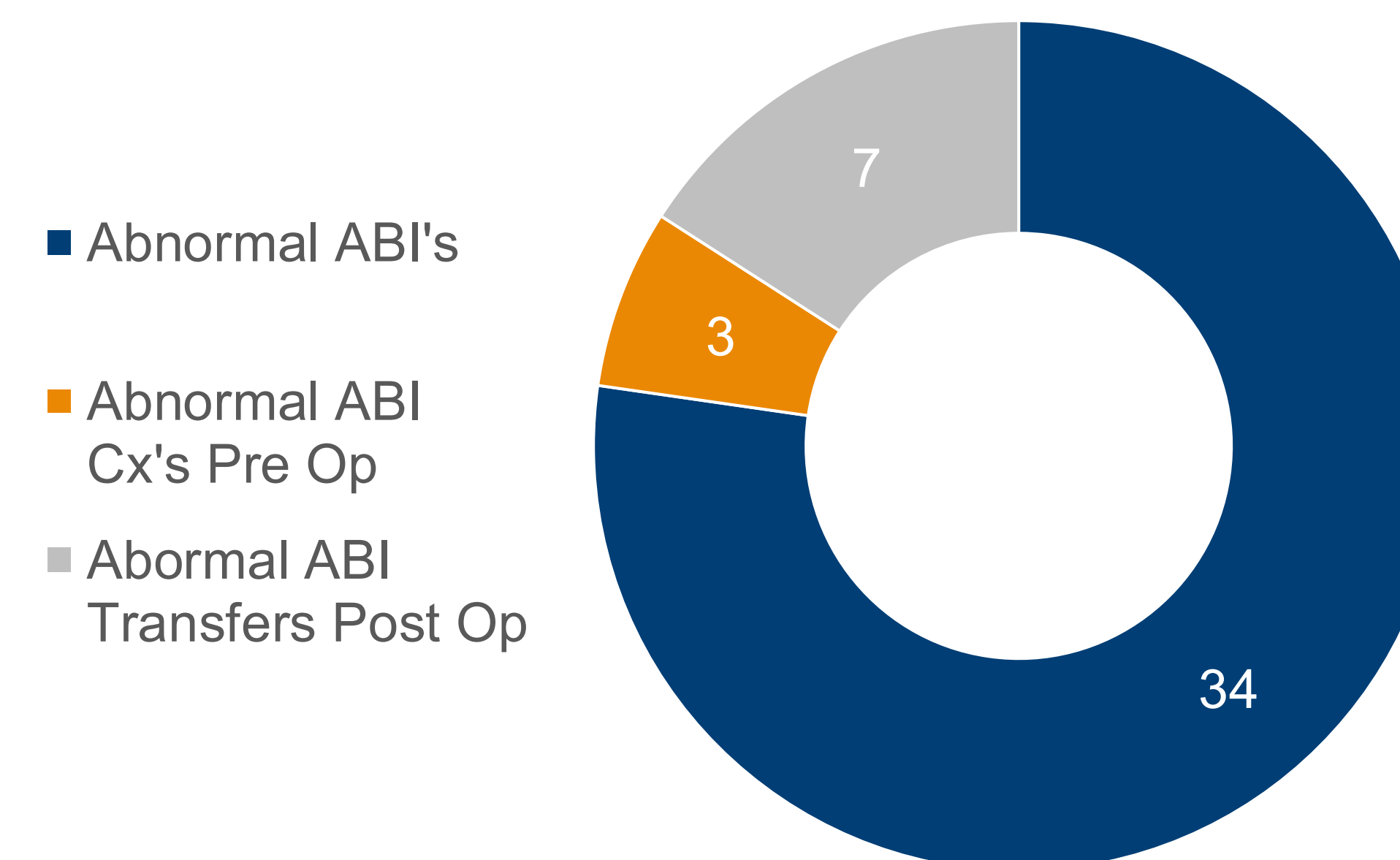
- Heparin Drip Protocol initiated. All post-op total knee patients with abnormal oscillometric ABI who are transferred out of facility will receive heparin drip.
- Initiate heparin 25,000 units in 250mL IVPB, infusing over 12 hours at 20.83 mL/hr.
 - Immediate anticoagulation with heparin for acute limb ischemia (ALI) reduces the risk of limb loss².

Results

ABI Checks



ABI Results



Conclusion

27 of 34 patients with abnormal oscillometric ABI showed resolution without requiring intervention.

Existing literature indicates ABI below 0.7 is associated greater odds of failure and higher risk for earlier failure³. **Our findings suggest that an ABI value alone was not the strongest predictor of acute ischemic limb.**

Instead, **postoperative inability to palpate a pulse—preventing ABI measurement—combined with assessment of the 6 P's of acute limb ischemia** (pain, pallor, pulselessness, paresthesia, paralysis, and poikilothermia)³ **played a significant role in determining which patients required escalation.**

Six of seven transfer patients received timely vascular intervention within the recommended six hours⁴. One patient's intervention occurred outside this window but was completed as soon as clinically feasible.

All seven patients were reported to be doing well following intervention, supporting the effectiveness of this escalation pathway.

References

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3. Gad, B. V., Langfitt, M. K., Robbins, C. E., Taimo, C. T., Bono, O. J., & Bono, J. V. (2020). Factors influencing survivorship in vasculopathic patients. Journal of Knee Surgery, 33(10), 1004–1009. <https://doi.org/10.1055/s-0039-1688929>
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