Muscle Trauma from Tourniquet (Mis)Use

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A 16-YR-OLD obese male (body mass index: 35 kg/m²) underwent a 5-h left knee multiligamentous reconstruction under tourniquet application for a football-related injury. Postoperative analgesia was provided with 0.2% ropivacaine infused through femoral and sciatic nerve catheters. After surgery the patient complained of excessive pressure in his thigh. On postoperative day 1, he developed loss of ankle dorsiflexion, cola-colored urine (myoglobinuria), and increased blood creatine phosphokinase (more than 32,000 units/l). His thigh compartment pressures were found to be high but did not warrant fasciotomy. He was treated with forced alkaline diuresis to prevent acute renal failure. His foot weakness recovered after 9 months of physical therapy.

An axial fat saturated contrast enhanced T1-weighted magnetic resonance image of his left thigh (fig.) was obtained on postoperative day 3. There is heterogeneous muscle enhancement involving anterior, medial, and posterior compartments (predominantly adductor magnus and vastus lateralis). Central areas of lack of enhancement indicate muscle necrosis (arrows), an imaging appearance consistent with rhabdomyolysis.1

Extreme tourniquet-induced ischemia causes metabolic (anaerobic), cellular, and microvascular changes (endothelial injury), leading to muscle breakdown (rhabdomyolysis) and compartment syndrome.2 Although there are no tourniquet guidelines specifically pertaining to muscle injury, inflation pressure ≥100 mmHg above systolic blood pressure, inflation time ≥120 min, deflation time ≥30 min, and re-inflation time ≥90 min are recommended to prevent ischemic nerve injury.3 Tourniquet pressure (300 mmHg) and duration (150 min inflation, 30 min deflation, and 100 min re-inflation) in our patient exceeded guidelines. It is likely that ischemia was exaggerated by tourniquet size-mismatch due to obesity. Our case calls for strict adherence to tourniquet guidelines, prompt diagnosis, and timely intervention to prevent tourniquet related morbidity.

References

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