

Assessing the Risk of Pressure Injury during Percutaneous Nephrolithotomy Using Pressure Mapping

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Abstract : Introduction: Percutaneous nephrolithotomy (PCNL) is the gold-standard procedure for removing large or complex renal stones. Many operating positions can be used, and the debate over the ideal position continues. PCNL can be a long procedure during which patients can sustain pressure injuries. These injuries are often underreported in the literature. Interface pressure mapping records the pressure loading between a surface and the patient. High pressures with prolonged loading result in ischaemia, muscle deformation, and reperfusion which can cause skin breakdown and muscular injury. We compared the peak pressure indexes of common PCNL positions to identify positions which may be at high risk of pressure injuries. We hope the data can be used to adapt high-risk positions so that the PPI can be lessened by either adapting the positions or by using adjuncts to lower PPI. Materials and Methods: We placed a 23-year-old male subject in fourteen different PCNL positions while performing interface pressure mapping. The subject was 179 cm with a weight of 63.3 kg, BMI 19.8kg/m². Results: Supine positions had a higher mean PPI (119mmHg (41-137)) compared to prone positions (64mmHg (32-89)) (p=0.046 two tailed t-test). The supine flexed position with a bolster under the flank produced the highest PPI (194mmHg), and this was at the sacrum. Peak pressure indexes >100mmHg were recorded in eight PCNL positions. Conclusion: Supine PCNL positions produce higher PPI than prone PCNL positions. Our study shows where 'at risk' bony prominences are for each PCNL position. Surgeons must ensure these areas are protected during prolonged operations.

Keywords : PCNL, pressure ulcer, interface pressure mapping, surgery

Conference Title : ICU 2022 : International Conference on Urology

Conference Location : Istanbul, Türkiye

Conference Dates : March 21-22, 2022