The Effectiveness of Cast Cutting – Comparing Plaster of Paris and Fiberglass Casts

Christian J. Zaino MD, Mukund R. Patel MD, Melissa S. Arief MD, Bhaveen Kapadia MD – SUNY Downstate Medical Center, University Hospital of Brooklyn, New York 11203

Introduction:
• There is limited data on how cast material and wrist size affect edema-induced pressure within a short arm cast (SAC).
• We sought to: (1) compare differences in peak pressure and effectiveness of cast cutting in SACs made with plaster of Paris (PoP) and fiberglass (FG) and (2) evaluate if wrist size and peak pressure relate.

Materials and Methods:
• 19 volunteers (13M, 6F, avg. age 24yrs).
• Circumferences of distal palmar crease (DPC) and distal radial ulnar joint (DRUJ) were recorded for each wrist.
• Wrists were casted in neutral position with PoP then FG using 1 roll of 2-inch webril, 4-inch PoP and 2-inch FG. Totaling 76 casts.
• A 50mL IV bag was incorporated into a SAC and connected to a pressure transducer. A syringe infused air to simulate swelling.
• Pressures were recorded during low and high pressures and during cast cutting.

Results:
• FG SACs had significantly higher pressure:
  - Initial: 25.9 vs. 13.8mmHg, p<0.0001.
  - Peak: 149.7 vs. 113.6mmHg, p<0.0001.
  - Ace wrap: 31.4 vs. 28.1mmHg, p=0.0047.
• Significant inverse relationship between peak pressure and circumference for PoP:
  - DPC: \( \beta = -0.0657 \pm 0.0122, p<0.0001. \)
  - DRUJ: \( \beta = -0.0419 \pm 0.0072, p<0.0001. \)
• Significant inverse relationship between peak pressure and circumference for FG:
  - DPC: \( \beta = -0.0534 \pm 0.0068, p<0.0001. \)
  - DRUJ: \( \beta = -0.0320 \pm 0.0043, p<0.0001. \)
• Moderate negative Person correlation for PoP SAC peak pressure and wrist size:
  - DPC \( r = -0.6777 \) and DRUJ \( r = -0.7087. \)
• Strong negative Person correlation for FG SAC peak pressure and wrist size:
  - DPC \( r = -0.8028 \) and DRUJ \( r = -0.7894. \)

Conclusions:
• FG SACs have HIGHER pressures than PoP SACs throughout the entire study – use FG with caution.
• Higher peak pressures occur in patients with smaller DPC and DRUJ circumferences.
• A study examining cut location (ulnar-radial vs. dorsal-palmar) is now warranted – can pressure reduction improve due to cut location?