Continuous Compartmental Pressure as an aid to Diagnose Acute Compartment Syndrome

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Purpose: Prompt and accurate recognition of compartment syndrome (CS) remains critical to avoid both irreversible complications and unnecessary fasciotomies. A novel Health-Canada licensed device (MY01) was used to continuously measure intracompartmental pressures (ICPs). The MY01 Mobile Application was used concomitantly to visualize pressure measurements on the physicians' mobile phones. This study was primary performed to assess the safety and efficacy of use.

Methods: Patients with clinical suspicion of developing CS were enrolled in the study. Informed consent was obtained from patients and orthopaedic surgery residents. The device was inserted in the compartment that was deemed most at risk of developing CS and ICP was continuously measured for up to 24 hours and was transmitted to the participant's mobile phone via Bluetooth. Fractures were classified according to the AO/OTA classification. Patients clinical signs and pain levels were recorded. Patients were followed up at the 2 and 6-week dates post-enrollment. Complications during insertion and monitoring were recorded. Additionally, a satisfaction questionnaire was sent to grade the device's usability.

Results: 28 patients were enrolled into the study, which was conducted from July 2020 through January 2022. The device was in place for an average of 15 hours 25 min. There were 21 males and 7 females. The mean age was 47 years (range, 19-66). There were 19 tibia fractures (68.9%), 4 radius fractures (14.3%), 3 ulna fractures (10.7%), 1 fibula (3.57%), and 1 humerus fracture (3.57%). Three patients had evidence of CS. Our data suggest that the group with CS had higher average pressure medians than the non-acute CS group (44.5 mm Hg vs 17.44 mm Hg, $P<0.005$). 84.4% of participants were confident in the placement of the device; confidence in device function was reported by 76% of the participants.

Conclusion: There were no complications related to the use of the device, no infections related to insertion, and no complications at removal. There were no issues related to the Bluetooth connectivity or the Mobile Application. Ongoing data are being collected to validate the clinical relevance of the compartment pressures to further elucidate not only the thresholds related to acute CS onset but also the importance of pressure trends over time. Understanding the full pressure profile of the disease will help us understand its onset and evolution in order to treat it more promptly while reducing instances of false positives.