Comparison of a Needle-Free Injection System for Local Anesthesia versus EMLA® for Intravenous Catheter Insertion in the Pediatric Patient
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Introduction: Placement of intravenous (IV) catheters is a painful and stressful procedure in children. Pain free IV catheter placement can be achieved by the application of local anesthetic prior to cannulation. Topical local anesthetic preparations such as EMLA® have become the standard of care in most pediatric institutions. However its use is affected by the fact that effective analgesia requires application approximately 60 minutes before IV placement and that vasoconstriction can be present, leading to difficult IV placement in 36-40% of patients (1, 2). The J-Tip® is a new needle-less FDA approved injection system that can be used for delivery of local anesthetic. The lack of needle involvement, quick onset of action, and absence of vasoconstriction makes it an attractive option for local anesthetic delivery prior to IV placement in the pediatric population. This study compares the effectiveness of J-tip versus EMLA to provide adequate analgesia prior to IV cannulation. We report our interim results here (The study will be completed by January 2005).

Methods: This study is conducted as a randomized controlled trial (RCT). Children between 7-18 years of age who required IV placement prior to elective surgery were eligible for the study. Subjects were randomized to receive either 2.5 grams of EMLA on both hands (dorsum) or 0.3 ml of 1% buffered lidocaine with J-Tip for local anesthetic prior to IV placement. Each subject was observed for the number of attempts for IV placement, pain during the application of local anesthetic and pain during IV cannulation using a 0 to10 Visual analogue scale. Analysis includes calculation of descriptive statistics for pain ratings and number of attempts for cannulation, as well as Wilcoxon rank-sum tests comparing these outcomes between groups. A P value <0.05 was considered to be statistically significant.

Results: Data from 93 children have been obtained, 56 children in the J-tip group and 37 children in the EMLA group (Difference in number of patients between groups is due to the use of simple randomization). Groups are similar in age and gender distribution 50% M/F, between ages 8 to 17 years old (median 13).In the EMLA group the mean time after application was 78.30 min (SD 33.57). There was a significant difference (p=0.0001) in pain ratings during IV cannulation between EMLA group (median: 3, IQR25-75: 1.5-5) and J-Tip group (median 0, IQR25-75: 0-2). There was no significant difference (p=0.096) in the pain ratings between groups at the time of application of the J-Tip (median: 0, IQR25-75: 0-0) compared to EMLA at the time of dressing removal (median: 0, IQR25-75:0-1). Also, there was not significant difference between the number of attempts for IV cannulation between J-Tip (mean 1.17, SD 0.43) and EMLA (mean 1.22, SD 0.59).

Discussion: The preliminary results suggest that: J-Tip application of lidocaine 1-3 minutes before IV cannulation had better anesthetic effectiveness compared to EMLA applied for 60 minutes. The number of attempts for IV cannulation was similar for both techniques. The characteristics of J-Tip, such as, decrease time for application prior to IV cannulation and lack of needle involvement make J-Tip an attractive method for local anesthesia application prior to IV cannulation in the pediatric population

References: