Medical Clowns Facilitate Nitrous Oxide Sedation during Intra-Articular Corticosteroid Injection for Juvenile Idiopathic Arthritis

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ABSTRACT: **Background:** Intra-articular corticosteroid injection (IACI), a common procedure in juvenile idiopathic arthritis, is usually associated with anxiety and pain. In a previous study, we concluded that nitrous oxide (NO_2) provides effective and safe sedation for such procedures. Following the introduction of medical clowns in our hospital, we added them as an integral part of the team performing IACI.

Objectives: To prospectively evaluate the effect of a medical clown on pain perception during intra-articular corticosteroid injection for juvenile idiopathic arthritis using NO_2 conscious sedation.

Methods: Patients scheduled for IACI first met and interacted with the medical clown. During the procedure, the rheumatologist and the medical clown worked in parallel to create distraction. NO_2 was administered. The patient, parent, physician, medical clown and nurse completed a visual analog scale (0–10) for pain. Change in heart rate ≥ 15% was recorded to evaluate physiologic response to pain and stress.

Results: A total of 46 procedures were performed in 32 children: 23 girls, 9 boys, with a mean age of 10.9 ± 3.6 years. The median visual analog scale pain score for the patients, parents, physicians, medical clown and nurses was 2, 2, 1, 1 and 1, respectively. Five patients had increased heart rate and experienced increased pain.

Conclusions: Active participation of a medical clown during IACI with nitrous oxide for juvenile idiopathic arthritis further decreases pain and stress and results in a positive patient experience.

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KEY WORDS: intra-articular corticosteroid injection (IACI), medical clown, juvenile idiopathic arthritis (JIA), joint injection, pain, nitrous oxide (NO_2)

Intra-articular corticosteroid injection (IACI) is a common therapeutic procedure in the management of juvenile idiopathic arthritis (JIA) within the pediatric rheumatology community [1,2]. IACI is useful especially in oligo-articular disease or in "break-though" joints in polyarticular disease with systemic therapy. An additional advantage is the very rapid response with regard to decreasing pain, stiffness, disability and swelling [1]. Major side effects are few except for the pain and anxiety that accompany the procedure [3].

Several techniques are used in an effort to reduce pain, including conscious sedation with intravenous benzodiazepine or general anesthesia [4,5]. The use of nitrous oxide (NO_2) as a sedative and analgesic for mildly to moderately painful pediatric medical procedures is well reported [5,6]. NO_2 can be safely administered at up to 70% concentration by nasal mask for pediatric procedural sedation, particularly for short procedures (< 15 minutes). NO_2 seems safe for children of all ages [5,6] and provides effective and safe sedation for children with JIA undergoing intra-articular injections [3,4,7].

The goal of distraction therapy is to shift the patient's focus from the pain-inducing source. These methods have been shown to decrease pain levels and improve physiologic parameters, such as blood pressure and tachycardia.

Several studies have shown that the presence of trained medical clowns significantly reduces preoperative anxiety in children [8-10]. Trained clowns clinically and statistically enhance the effect of oral midazolam [8,9]. The clown can facilitate the induction process and represents a proven effective alternative to midazolam [9,10]. Moreover, the clown's presence leads to the child's recollection of the procedure as bearable and not unpleasant.

In a previous study, we demonstrated NO_2 analgesia to be safe and effective for IACI in JIA. Parental and staff satisfaction with the treatment was high [3]. Following the introduction of the medical clowns in our hospital, we added a medical clown as an integral part of the team performing IACI. This study aimed to prospectively evaluate whether a medical clown affects pain perception during intra-articular corticosteroid injection in juvenile idiopathic arthritis using nitrous oxide conscious sedation.

PATIENTS AND METHODS

The study population comprised children and adolescents 5 to 18 years of age who were scheduled for IACI and whose parents provided written informed consent after receiving an explana-

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tion of the study. The study was approved by the Institutional Ethics Committee.

The medical clown was the first staff member of the IACI team to meet the child and his/her parents and show them the room and equipment. EMLA Cream (Astra-Zeneca, Wilmington, DE, USA) was placed by the nurse over the joints scheduled for injection 1 hour before the procedure. All children received injections while under NO_2 conscious sedation. The MDM-Matrix N20 mixer® was used to administer NO_2. It allows various concentrations of NO_2 to be used with a minimum O_2 level of 30% and has a non-rebreathing circuit. Sedation was performed in the Pediatric Day Care Unit by a specially assigned pediatrician who had undergone formal training for sedation and pediatric advanced life support training. Oxygen saturation and heart rate (HR) were constantly monitored and recorded by a team member not participating in the injection procedure. Blood pressure (BP) was recorded. NO_2 concentration was gradually increased to between 30% and 50% and was maintained throughout the procedure (there were no age-related differences in NO_2 concentration). Patients were not restrained and when possible the mask was self-held. At the end of the procedure, 100% oxygen was administered for 3 to 5 minutes.

A medical clown was present in the room during the entire procedure, acting and interacting with the child in order to distract his/her attention from the painful procedure and to decrease anxiety. During the procedure, the medical clown worked simultaneously with the pediatric rheumatologist, mimicking the physician's actions. For example, putting water-based stickers ("tattoos") on the child while the physician was sterilizing the skin and inserting the needle (to see a video of the procedure, follow the link): http://hospitals.clalit.co.il/hospitals/meir/children/clowns/Pages/Medicalclowns.aspx

Procedural pain was assessed by the patient, parent, participating nurse, medical clown, and physician using an age-specific visual analog score (VAS) with a scale of 0–10, where 0 is "no pain" and 10 is "the worst pain imaginable" [11].

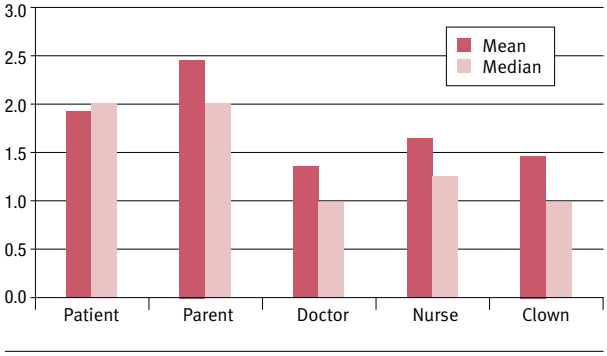
STATISTICAL ANALYSIS

Nominal data were described by numbers and percentage. Continuous variables by mean, standard deviation and median as data were not normally distributed (Shapiro-Wilks test). Comparison of two groups for categorical data was done using chi-square or Fisher's exact test, each when appropriate. Comparison of continuous parameters was performed with the Mann-Whitney non-parametric test. A P value < 0.05 was considered statistically significant. All statistical analyses were performed using SPSS-19.

RESULTS

A total of 46 procedures were performed in 32 children: 23 girls and 9 boys, with a mean age of 10.9 ± 3.6 years (range 5–18 years). Of these, 25 children had oligoarthritis, 6 had polyarthritis and 1 had ankylosing spondylitis. Four children had two procedures on separate visits and five had three procedures. Fourteen children had more than one injection on the same day (for example, in both knees). Their VAS was rated once for all injections together. A total of 42 knees, 9 ankles, 4 wrists, 3 sub-talar joints and 1 elbow were injected.

Figure 1. Median and mean pain VAS scores for the patients, parents, physicians, nurses and medical clown



The median VAS pain scores for the patients, parents, physicians, medical clown and nurses were 2, 2, 1, 1 and 1.3, respectively, and the means were 1.9, 2.4, 1.4, 1.5 and 1.6 [Figure 1].

Increased HR (a difference of > 15% in the HR measured before and during the injection) was recorded in five patients. They also experienced increased pain, mean VAS score of 3.7 ± 2.7 (median 3) compared to the mean VAS score of the other children, which was 1.6 ± 1.7 (median 1), $P = 0.024$ ($P = 0.048$ by Mann-Whitney). This difference was not observed in the VAS evaluations of the parent and staff.

There were no differences in the VAS score between boys and girls, older and younger children, children who had injections in the past compared to first-time injections, and children who underwent one procedure compared to double injections.

Recovery time from the procedures was immediate. There were no adverse reactions. No patient had a decrease in oxygen saturation levels. One child laughed, one child cried, one reported fear, and two reported anxiety. One patient got off the bed right before the injection and ran out the room.

DISCUSSION

Our study demonstrates for the first time the additive effect of the active participation of a medical clown to the analgesic and anxiolytic effect of sedation during IACI for JIA. In our previous study using NO_2 alone, patients, parents, doctors and nurses [3] had a median VAS score of 3, whereas with the attendance of a medical clown the median VAS scores were lower: 2, 2, 1 and 1, respectively.

Although NO_2 provides safe and effective analgesia for IACI procedures in children [3,4,7], anxiety can persist and exacerbate many procedures [9,12-14]. Anxiety related to invasive medical procedures is associated with increased analgesic consumption, general anxiety and behavioral problems [9].

Furthermore, the memory of a painful procedure may cause anxiety about subsequent procedures and might influence the degree of pain the child feels [12,14]. In the surgical world it is well known that relieving preoperative anxiety in a child will reduce the child's negative response to subsequent medical care, a common scenario in JIA [9]. Investigation of several accepted approaches to managing preoperative anxiety demonstrated that the active participation of a medical clown decreases and alleviates pediatric preoperative anxiety [8-10]. In the current study, the lower pain assessments by all participants compared to our previous study (using the same analgesic technique without a medical clown) demonstrate that the presence of a medical clown reduced anxiety and pain perception during IACI.

Medical clowns undergo 3 years of formal training before working in the hospital. They use several techniques to decrease the children's anxiety. Prior to the procedure and the arrival of the rheumatologist, the clown describes what is about to happen. The older children write the rheumatologist a letter of intention, specifying their expectations from the procedure, enabling them to gain control of a frightening situation. During the procedure, the rheumatologist and the medical clown work in parallel to create physical and psychological distractions. The clown is constantly engaged with the child throughout his/her stay, including during the meal provided after the sedation, creating a close and intimate environment for the child.

Interestingly, parents perceived the procedure as more painful as compared to the other raters, including the children. Nonetheless, the parents rated the pain as less severe in comparison to our previous study, emphasizing the effectiveness of the medical clown intervention.

This study has several limitations. First, it was not blinded. All participants rated their perception of the child's pain at the end of each procedure. Also, it is possible that as the team became more experienced, their work became more harmonious and interactive for the children. The medical clowns in our pediatric departments take part in many procedures and situations with good feedback; hence we did not include an active control group in parallel with the current study. A randomized controlled study design could strengthen our results.

While other distraction methods such as play specialists or video games might add to the effect of NO_2 similar to the added value of the medical clown, we feel that the personal medicine (i.e., the face-to-face) approach made a difference in the procedure experience of the child and the team. In general, all staff, parents and patients were highly satisfied with the addition of the medical clown to the IACI team.

CONCLUSIONS

Active participation of a medical clown during IACI for JIA, along with NO_2 conscious sedation, further decreased pain and anxiety and resulted in a positive patient experience.

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"If we desire respect for the law, we must first make the law respectable"

Louis D. Brandeis (1856-1941), American lawyer and associate justice on the Supreme Court of the United States