

Conventional and Camouflage Syringe during Maxillary Dental Procedures: Relevance to Anxiety and Pain Levels in Children

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To compare the effects of conventional and camouflage syringe in reducing anxiety and pain levels during maxillary dental procedures in paediatric patients. Children between 4 and 14 years who attended Dental Clinic, MAHSA University, Malaysia and required local anesthesia, were randomly selected for the present study with due consent from the parents/guardian. The materials needed for local anaesthesia were laid out in view and anxiety levels were assessed using Venham's picture test. The procedure of local anesthesia was then carried out for both conventional and camouflaged groups. Pain assessment was performed following the infiltration technique using the Wong-Baker Faces pain scale. The anxiety levels following the infiltration were re-recorded using the Venham's picture test. Camouflaged group showed a significantly lower anxiety level as compared to conventional group both before and after infiltration. A moderate positive correlation ($r=0.659$; $p=0.014$) was observed between anxiety level after infiltration and perceived pain in conventional group, but the camouflaged group did not show any significant association between anxiety level after infiltration and perceived pain. Direct sight of the conventional syringe had increased anxiety levels and in turn increased the pain perception levels. Thus, it can be suggested that in pediatric patients and/or patients with injection phobia camouflaged syringe is a good alternative.

Keywords: Camouflage Syringe; Conventional Syringe; Dental Anxiety; Pain.

Untreated dental problems have been on the rise worldwide and the main reason quoted is the fear and anxiety towards dental operative procedures. According to the vicious cycle model of dental fear-related avoidance and evading from treatment lead to worsening of dental health that in turn needs more intensive management. These in turn reinforce the anxiety

and fear leading to continued avoidance to dental treatment¹. Moreover, in the paediatric age group, the incidence of anxiety and fear is greater than in adults and there are varied reasons for this phenomenon. Some of the causes are general anxiety, parental attitude, fear of pain and past dental experiences^{2,3}. Of these the most common causes of dental fear is generally attributed to the

needle phobia^{4, 5}. Ironically most of the dental procedures require local anaesthetics to reduce the pain associated with the dental treatment.

It has also been proved that an anxious patient perceives more pain of longer duration as compared to less anxious patient⁶. Also acute pain is often accompanied by input from other sensory modalities, like visual stimuli which can facilitate the processing of pain⁷. Hence this study was conducted to see whether the elimination of the visual input of a needle and introducing it in a camouflaged and non threatening way would reduce the anxiety and pain sensation in children during local anaesthesia procedure.

MATERIALS AND METHODS

The present study was conducted in the Department of Paediatric and Preventive Dentistry, Faculty of Dentistry, MAHSA University, Malaysia. Ethical committee clearance was obtained before the beginning of this study and a detailed informed written consent form was signed by each patient's parents or guardian, who willingly participated in this study and verbal consent was obtained from the participating children.

Selection Criteria

Twenty-four children who visited the Department of Paediatric Dentistry, Faculty of Dentistry, MAHSA University, Malaysia were selected for the study and randomly divided into two groups based on convenience sampling: Group 1 included Conventional syringe group (Metal syringe), while Group 2 represented Camouflaged syringe group. For the selection of subjects,

inclusion criteria were: (a) children of 4 to 14 years of age, (b) children requiring treatment (which needed local anaesthesia) only in maxillary arch, and (c) children who had never experienced local anaesthesia. Children who are mentally challenged, with the record of systemic diseases or severe phobia of needles or injection were excluded from the study.

Materials and Protocol

In this study (a) conventional local anaesthetic syringe, local anaesthetic cartridge (mepivacaine HCl levonordeprin, scanodest 2% with epinephrine), (b) camouflage sleeves of two colours green and pink, with decorative stickers, (c) topical anaesthetic gel (ZAP topical anaesthetic gel), and (d) short 27-gauge needle were used (Fig 1).

Children were randomly assigned into either the treatment or control group. Randomisation by block allocation were done statistically based on a table of numbers, using computerised program. Due to the nature of intervention it was not possible to blind either the dentist or the patient to the intervention.

Basic examinations were performed followed by patient's behavioural assessment using Frankle's behaviour rating scale⁸. Diagnosis and treatment plan were noted and children with 'positive' and 'definitely positive' rating were selected. The procedure was explained in detail to the patient before the treatment. Following this the materials needed for the local anaesthesia was laid out in view and anxiety levels were assessed using Venham's picture test⁹. The procedure of local anaesthesia was then carried out as follows,

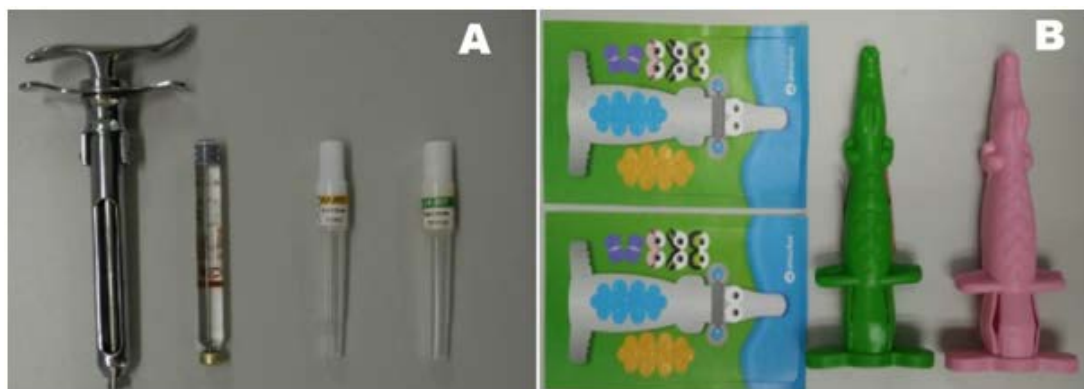


Fig. 1. (A) Conventional syringe and (B) Camouflage sleeve

the area of intended infiltration was dried with cotton and topical local anaesthetic gel was applied for 2 minutes. Once the subjective symptoms were confirmed, the infiltration procedure, as per the technique (1.35 ml), was carried out. For the camouflaged technique, the camouflaged sleeve was placed over the regular anaesthetic cartridge, thus disguising the entire syringe and allowing only the needle tip to be protruding through. Pain assessment was done following the infiltration technique using the Wong-Baker Faces pain scale¹⁰. The anxiety levels following the infiltration were recorded using the Venham's picture test. The required treatment was then carried out. The obtained test results were then subjected to statistical analysis.

RESULTS

Twenty-four children were selected for the study and were randomly divided into the two groups. Table 1 depicts the study characteristics

of the subjects. The subjects in conventional group (Group 1) had mean age (SD) of 8.54(2.50) years whereas subjects in camouflage syringe group (Group 2) had mean age(SD) of 10.55(3.2) years and there is no statistically difference in the age groups. Hence randomization procedure was satisfactory. In this study, as depicted by Table 1, conventional syringe Group 1 patients had significantly higher pain score (6±3.05) after infiltration as compared to camouflage syringe group (2.18±1.88) ($p<0.05$).

In Table 2 we see the analysis of the anxiety levels before and after infiltration for both Group 1 and Group 2. On the intergroup comparison it was observed that Group 2 subjects had a significantly lower anxiety level as compared to Group 1 both before and after infiltration ($p<0.05$). However, there was not significant difference in anxiety level when compared before and after infiltration in both the study groups ($p>0.05$) these findings indicate that anxiety levels are decreased when camouflage syringe is used.

Table 1. Pain levels after infiltration in both the groups

| Groups | Age | | Pain Level After Infiltration | |
|--------------------------|-------------|---------------|-------------------------------|---------------|
| | Mean(SD) | Median(Q1-Q3) | Mean(SD) | Median(Q1-Q3) |
| Group 1 | 8.54(2.50) | 8(7-10.5) | 6(3.05) | 6(4-10) |
| Group 2 | 10.55(3.20) | 11(7-13) | 2.18(1.88) | 2(0-4) |
| U statistic [#] | 45.5 | 20.50 | | |
| p-value | 0.129(NS) | 0.002* | | |

Mann Whitney U test

P>0.05 non-significant, NS

*P<0.05 statistically significant

Table 2. Anxiety levels before and after infiltration in both the groups

| Groups | Anxiety Level Before Infiltration (Boxes) | | Anxiety Level After Infiltration | | z ^{##} | p-value |
|--------------------------|---|----------------|----------------------------------|----------------|-----------------|-----------|
| | Mean (SD) | Median (Q1-Q3) | Mean (SD) | Median (Q1-Q3) | | |
| Group 1 | 5(1.47) | 5(4-6) | 5.62(1.93) | 6(4-7) | -1.344 | 0.179(NS) |
| Group 2 | 1.36(1.91) | 1(0-2) | 0.91(1.44) | 0(0-2) | -0.632 | 0.527(NS) |
| U statistic [#] | 14.00 | 4.50 | | | | |
| p-value | 0.001* | <0.001* | | | | |

[#]Mann Whitney U test

^{##}Wilcoxon sign rank test

P>0.05 non-significant

*P<0.05 statistically significant

Table 3. Correlation of anxiety and pain

| | | Anxiety Level Before Infiltration | Anxiety Level After Infiltration |
|---|-------------------------|-----------------------------------|----------------------------------|
| Pain Level After Infiltration (Group 1) | Correlation Coefficient | 0.526 | 0.659* |
| | p-value | 0.065(NS) | 0.014* |
| Pain Level After Infiltration (Group 2) | Correlation Coefficient | 0.167 | -0.268 |
| | p-value | 0.624(NS) | 0.425(NS) |

Spearman's correlation test
P>0.05 non-significant, NS
P<0.05 statistically significant

With regards to the secondary outcomes, Table 3 depicts about whether there is a link between pain and anxiety, a moderate positive correlation ($r=0.659$) was observed between anxiety level after infiltration and perceived pain levels in Group 1 ($P<0.05$) suggesting that more the anxiety experienced by the patient higher will be the perceived pain levels or vice versa. However, there was no significant correlation observed between anxiety level before infiltration and perceived pain levels in Group 1 ($p>0.05$, NS). Also, in camouflage syringe, there is a no statistically significant correlation observed between perceived pain levels and the anxiety level before and after infiltration ($p>0.05$, NS).

Together these findings demonstrated that the use of Camouflage Syringe was associated with improved outcomes related to dental fear and anxiety in children.

DISCUSSION

Most children experience anxiety purely on the basis of psychological, social and environmental influences and parents and pediatric dentists face special challenges because children with anxiety tend to be nervous, avoidant, annoying or exhausting¹¹. Despite reductions in pain associated with dental visits and an increased awareness by dentists of the importance of building trusting relationships, dental fear or anxiety remains a major issue for dental clinicians and their patients¹². Ironically, the injection of local anesthetics which are the main way of reducing the pain associated with dental treatments is often the only perceived painful part of the dental procedure¹³. Indeed, one of the most common

causes of dental fear is generally attributed to 'the needle'⁴. The main reasons for anxiety associated with injections are the visual stimuli. It has been observed that acute pain is often accompanied by input from other sensory modalities, like visual stimuli which can facilitate the processing of pain⁷. Hence this study was conducted to evaluate if camouflaging the injection needle will reduce anxiety and pain associated with injections.

In this study we have used camouflaged syringe with crocodile shape and in two different colours compared to regular conventional syringe, to study the effect of regular and camouflaged syringes on anxiety and pain levels before and after infiltration techniques. We have used universally accepted anxiety and pain measuring scales.

In this study, the age range distribution was between 4 and 14 years old. Although the authors were aware that the wide age range could impact on the results, all patients chosen were found to be suitable in terms of their understanding and maturity. Even the results showed statistically no significant difference in relation to age, so its impact on the study results is overruled. Within the study design, all patients were chosen accordingly to the selection criteria and pre-assessed by the operator. This gave the opportunity to provide patients and parents with information related to the study and also to gain consent. All patients were selected based on their need for restorative dentistry in the right and left maxilla requiring local anaesthesia, since subjects with minimal anxiety might be included in clinical studies to improve the reliability of the measurement of pain¹⁴.

Topical anaesthetic was used to reduce pain associated with dental injections. In this study anxiety levels were measured before and after

giving local anaesthesia by using Venham's picture test, group 2 had showed statistically significant reduction in anxiety levels compared to group 1 even though intragroup is not significant. Results also showed that there is significant reduction in pain levels in camouflaged (Group 2) compared to conventional (Group 1). These findings are in agreement with the only study till now reported by Ujaoney *et al*¹⁵ Secondary outcomes of the study also showed more anxiety provokes more pain which is in accordance with Van wijk *et al*¹⁶ Together, our results strongly favour the use of camouflage syringe routinely in children seeking dental procedures requiring local anaesthesia.

Colours have a positive impact on the child's behaviour. It is possible that those colours may add to the comfort of a child, thus reducing dental anxiety. Therefore, researchers improvised coloured dental syringes with different cartoon or animal shapes to alleviate dental fear and anxiety in paediatric set up¹⁷.

There are some limitations in our study, first due to study design it was not possible to blind the dentist. However, we tried to minimise the bias by only one experienced Paediatric dentist to give local anaesthesia in both the groups.

With our findings along with Ujaoney *et al*¹⁵ camouflage syringe to the regular paediatric dental practice could be indicated. However, the commercially available camouflage syringes should have the manoeuvrability similar to conventional syringe and bulkiness of the sleeve should be reduced with age-relevant toy shapes. Also, there is a need of massive production of camouflage sleeves which should be cheaper and disposable.

CONCLUSION

The present study has demonstrated that camouflage syringe could reduce the mean pain and anxiety scores as compared to conventional syringe. The clinical significance of the results should be interpreted by larger population of different age groups as one unit. In addition, considering the advanced maturity in children, use of different shapes and colours of sleeves are recommended.

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