CLINICAL EVALUATION

OF THE

CLOSED MOUTH MANDIBULAR NERVE BLOCK TECHNIQUE IN CHILDREN

BY

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Profound anesthesia during the delivery of routine restorative and surgical procedures is one of the most important factors in the management of the child patient. [13,15] and reliable anesthesia of the three main peripheral branches of the mandibular nerve: The inferior alveolar, lingual, and buccal nerves are normally required for mandibular procedures. Historically, clinicians have encountered significant difficulties in consistently achieving anesthesia of the mandible.[11,12] This failure rate for the mandible is partially related to limitations of conventional methods [20] which rely on identifying intraoral land marks, including the coronoid notch, occlusal plane, and the pterygomandibular raphe. Anatomic variations of the mandibular foramen position also occur including location below the occlusal plane in young children with a change to a more superior and anterior position as age increases [5]. These and other anatomic variations of the mandible have led to a reported 15 to 35 % failure rate of conventional mandibular injection techniques [15,18].

They also require considerable patient cooperation frequently absent in a pediatric population.

In 1960 Vazirani [22] and again in 1977 Akinosi [1] described a closed mouth injection technique for achieving mandibular anesthesia. Subsequently , others [11] have advocated the use of this technique for oral surgical procedures. The closed mouth mandibular block reportedly has several advantages over conventional techniques including reliability of anesthesia of the inferior alveolar, lingual, and buccal nerves achieved by a single, less painful injection; an easily learned and administered technique and finally one which permits patients who are unable (or unwilling) to open their mouths widely to receive mandibular nerve block anesthesia [10].

All previous studies of the closed mouth technique have been on adult populations . [8,10,11,12,17,21] There are no controlled studies concerning its efficacy in children. Although Akinosi reported this technique to be unreliable for use in children, Vazirani [22] and Sato [17] both recommended its use in such populations. However, no data was included to support either position. This study was designed to evaluate the efficacy of the closed mouth mandibular block technique in a pediatric population requiring elective surgical and non-surgical treatment.

Anatomic consideration

The pterygomandibular space is a potential space between the pterygoid musculature and the ramus of the mandible. Superiorly, this triangular shaped space is bounded by the inferior head of the lateral pterygoid muscle and Medially by the internal pterygoid muscle as well as the broad sheet like sphenomandibular ligament. Anteriorly the space is bounded by the buccinator muscle.[2,11]

Contents of the pterygomandibular space include. (Fig. 1) The lingual and inferior alveolar nerves, which separate from each other on the deep surface of the lateral pterygoid muscle and emerge into the superior portion of the space on the lateral surface of the medial pterygoid muscle. The buccal nerve, which briefly passes through the upper anterior part of the space emerges into the space between the two heads of the lateral pterygoid muscle.[2,11]

In preschool children significant anatomic differences exist when compared to adults: the ramus is shorter and narrower and its flair is unpredictable[5]. The internal oblique ridge is often absent,and the pterygomandibular raphe is often ill defined. Finally the mandibular foramen position is usually lower and more posteriorly positioned when

compared to the adult ramus [3,15,23]. Thus an injection technique such as the closed mouth technique which deposits anesthetic higher in the pterygomandibular space, (Fig. 2) allows for more margin of error as it is not as dependent upon unpredictable anatomic variations should result in a high success rate.

Figure 1

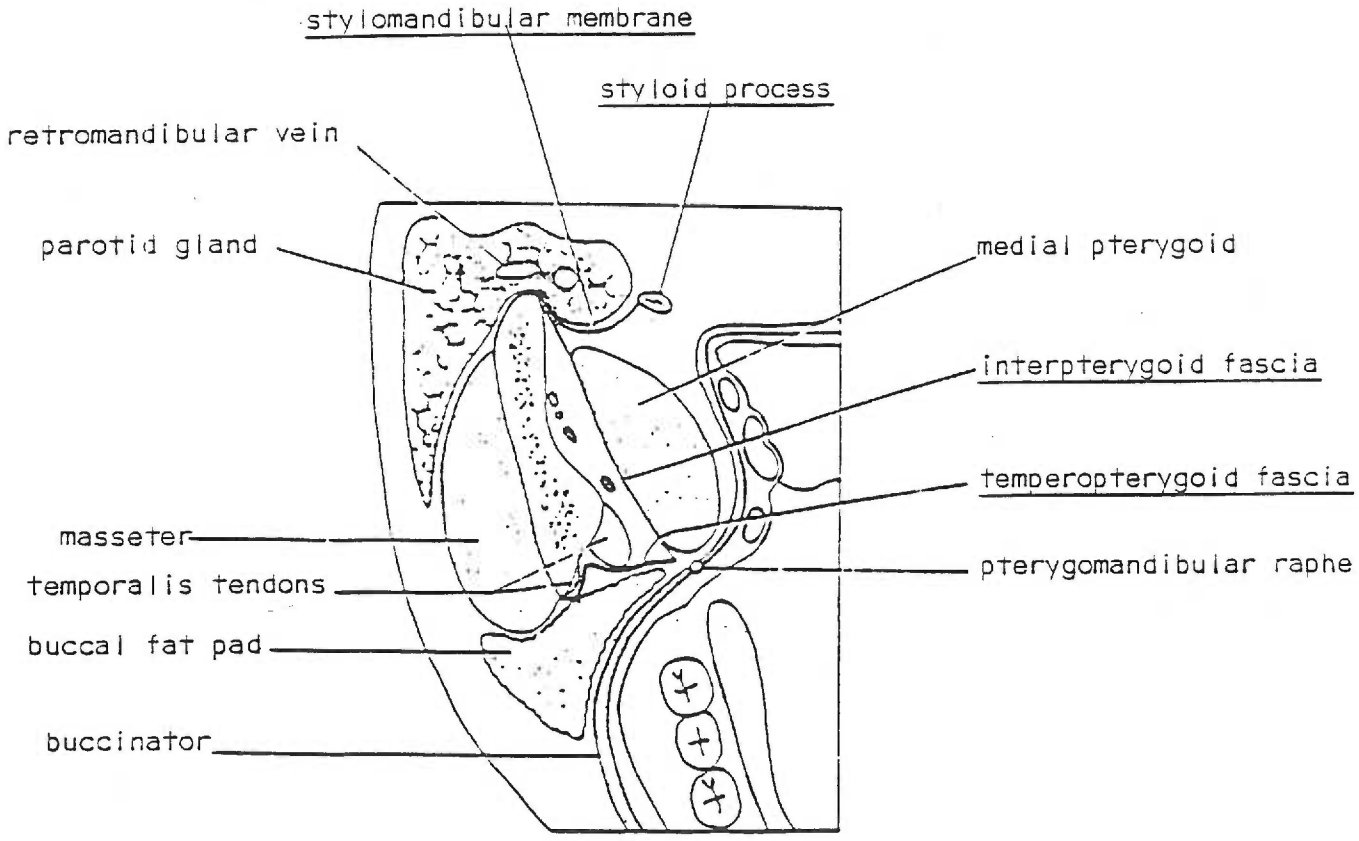


Diagram of the pterygomandibular space in transverse section illustrating the fascial sheets which bound the area.

Materials and methods

A within subject design was used in this study. The patient population consisted of 49 children or adolescents age 2 to 15 years. This diverse group was then divided into two sections; those equal to or less than 6 years of age and less than 60 pounds, and those 7 years or older and greater than 60 pounds. Each child required at least two appointments for either dental restorations or extractions of primary mandibular molars, and canines or permanent molars and premolars. Each child received one injection by closed mouth technique and a contralateral injection by a conventional mandibular nerve block technique. In both cases an aspirating dental cartridge syringe containing 1.8 ml. of 2.0 % Lidocaine with 1: 100,000 epinephrine was used. A disposable 27 gauge short needle was standard in all cases.

During the administration of the conventional mandibular block technique, approximately 1.0 ml. of anesthetic solution was deposited near the mandibular foramen in those children from group one (less than 6 years and under 60 pounds). Children from group two (7 years and older,and greater than 60 pounds) received 1.5 ml. of anesthetic solution. --In both groups, these respective amounts anesthetized both the inferior

alveolar and lingual nerves. .3 ml. of remaining anesthetic solution was then separately deposited in the mucobuccal fold adjacent to the most distal molar in order to anesthetize the buccal nerve. The Closed Mouth technique used in this study was similar to that previously described [2,3,9,10,11] The patient was placed in a semi-reclining position with the teeth gently brought into occlusion. The mucosa and underlying muscles of mastication were retracted and the anterior and posterior border of the ramus palpated. The syringe was aligned parallel to the occlusal plane but at the level of the maxillary mucogingival junction and the needle inserted just medial to the anterior border of the ramus. The needle was advanced in a posterior lateral direction (to partly compensate for the flair of the mandible) to a depth estimated to be two-thirds of the anterior-posterior dimension of the ramus [14], or approximately 1.2 -2.5 centimeters. This depth of insertion approximated the position of the mandibular foramen in children. However, since needle placement was considerably more superior than the conventional technique, it also was closer to the course of the mandibular, Lingual and Buccal nerves within the superior portion of the pterygomandibular space. (Fig. 2)

Figure 2

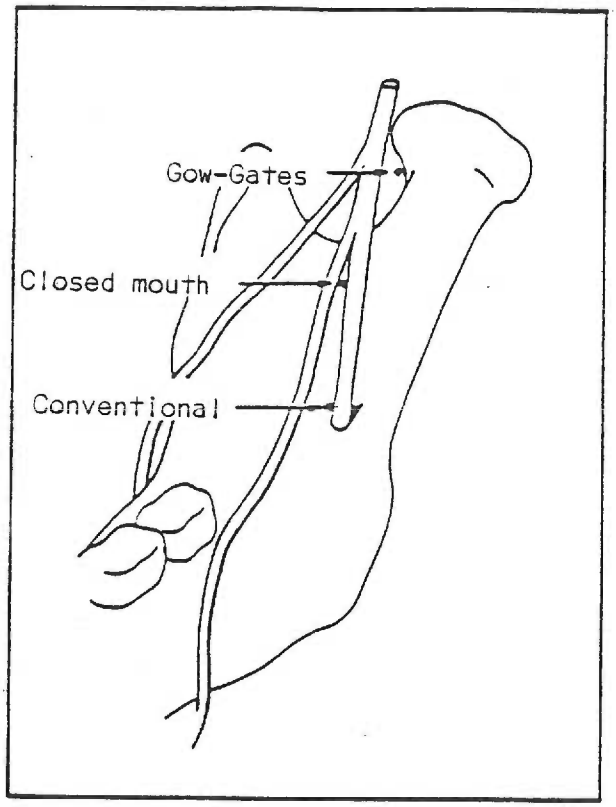


Diagram of injections sites within in the pterygomandibular space.

In order to standardize injection technique, each clinician participated in an instruction session where the closed mouth mandibular block was reviewed.

Then, after several weeks of familiarization with using the closed mouth mandibular block technique, the following data collection was obtained.

1. Age , sex and weight of the patient

discomfort during procedure, but no additional anesthetic needed; Fair -- moderate discomfort during procedure (the procedure was accomplished with reinjection desirable); Poor -- sufficient discomfort to stimuli that reinjection was required to initiate the procedure.

Aspiration of blood was simply noted as positive (+) -- having blood in the syringe upon aspiration, or negative (-) -- having no blood in the syringe upon aspiration.

Finally the Frankel scale ranking of patients cooperation was utilized. These include: (++) very good; very cooperative during the procedure ; (+)-- good , generally cooperative during the procedure (-) negative or relatively uncooperative during the procedure ,but procedure was accomplished , and (--) totally uncooperative towards treatment, treatment not accomplished.

Care was taken in patient selection to provide that similar procedures required bilaterally for acceptance,this was done to fairly test the two techniques.

The data was recorded on a standardized form along with any qualifying comments or observations. (Fig. 3) All data was then analyzed using the Chi square with P</= .05 being considered the minimum level of statistical significance.

Figure 3

DATE _____

NAME _____ DOB _____ AGE ____ YRS ____ MOS

CHART NUMBER _____ LOCATION: ____ HDS ____ GRAD PEDO

TYPE OF BLOCK: ____ Standard IA ____ Long Buccal ____ Akinosi ____ R ____ L

ANESTHETIC: _____ Amount (ml) _____

ONSET: ____ 1 min ____ 1-2 min ____ 2-3 min ____ 3-4 min ____ 5 min

EXTENT OF LOCAL ANESTHESIA: ____ IAN ____ LN ____ BN

PAIN ON INJECTION: ____ None ____ Mild ____ Moderate ASPIRATION OF BLOOD _____

PROCEDURE(S) PERFORMED: _____

_____

DURATION OF PROCEDURE(S) _____ Rubber Dam ____ Yes ____ No

ANESTHESIA RATING:
____ Excellent (procedure performed with no discomfort)
____ Good (slight discomfort during procedure)
____ Fair (moderate discomfort during procedure) (reinjection desirable)
____ Poor (extreme discomfort during procedure) (reinjection needed or unable to complete work)

Additional anesthetic given--amount (ml) _____

ROUTE: ____ Akinosi ____ Standard Block ____ Other: _____

FRANKEL SCALE: ____ ++ ____ + ____ - ____ --

COMMENTS: _____

_____

_____

Data form

Results

Ages of patients ranged from 2 years o months to 15 years 0 months. Group 1 consisted of 24 patients, 11 males and 13 females with a mean age of 4.0 years. Group 2 consisted of 25 patients, 14 males and 11 females with a mean age of 9.56 years . (table 1.) Chi square tests were performed to compare Groups 1 and 2 females, Group 1 and 2 males, and Group 1 and 2 females to Group 1 and 2 males for both the closed mouth technique and the conventional mandibular block. No significant difference was found between any of these groups. Therefore all results are of combined Date of groups I & II and are comparisons of C.M. Tech v. Con. Tech. Clinically excellent or good anesthesia was obtained in 79.6% of all patients, (comgined data of Groups I & II) receiving closed mouth mandibular blocks and 75.5% for patients receiving injections by a conventional mandibular block technique. (table 2) Although the success rate was slightly higher for the closed mouth technique this difference was not statistically significant.

DISCUSSION OF DATA OF GROUPS I & II

The onset of anesthesia whether using a conventional block or the

closed mouth technique is virtually the same. However in cases where onset was greater than 5 minutes this tended to be related to poor quality of anesthesia.

Positive aspiration of blood was only reported in 3 cases, one with the closed mouth technique and two with the conventional technique. Although the aspiration of blood was lower than the expected level of 11.3%* for the conventional technique, the aspiration of blood in the closed mouth technique was 1/2 the that of the conventional technique.

Pain upon needle insertion and injection and the deposition of anesthetic was statistically different between the two techniques whether patients were in group1 or 2. The use of the closed mouth technique resulted in fewer responses in the pain categories. Specifically, the greatest difference was in the pain free category, when use of the closed mouth technique resulted in a pain free injection 63.3% of the time, whereas the comparative result with the conventional technique was only 16.3% (Table 4).

No statistical difference was found in the behavior of the children between the two techniques, there were slight differences between groups 1 and 2 but better behavior would be expected with age. (Table 5)

Types of procedures were approximately equal from group 1 to group 2

with the exception of permanent restorations and extractions, due to the range in age of group 1. the majority of these occurred in group 2. Table 5 indicates the type and number of procedures completed after anesthesia was obtained.

Profound reliable anesthesia was obtained in 87.75% of those attempted using the closed mouth technique,compared to only 75.5% for the more familiar conventional mandibular nerve block technique. Usable buccal nerve anesthesia was reported in 86.% of the successful closed mouth injections.

Table 1 **Age and sex distribution**

group	N	mean and Sd.	males	females
1	24	4.0 ± 1.06	11	13
2	25	9.56 ± 1.45	14	11
1 & 2	49	6.8 ± 3.34	25	24

Figure 4

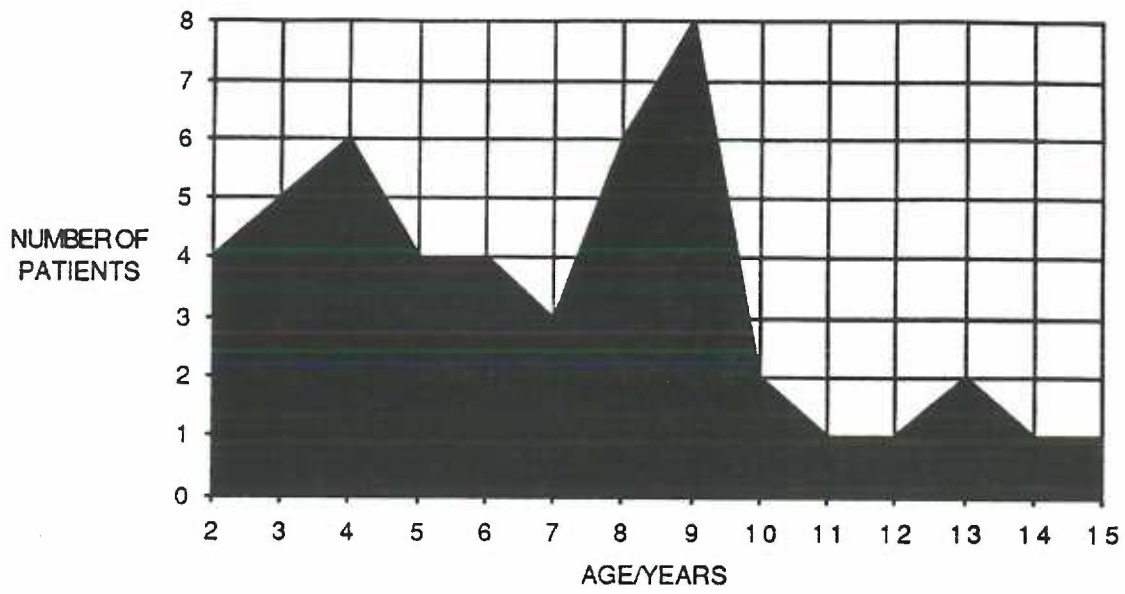


Table 2 . Anesthetic quality of closed mouth versus conventional anesthetic techniques

Rating	Group 1		Group 2		Group 1 & 2	
	C.M.	Con.	C.M.	Con.	C.M.	Con.
Excellent	18	12	12	16	30	28
Good	3	6	6	3	9	9
Fair	2	2	2	4	4	6
Poor	1	4	5	2	5	6

C.M. = Closed mouth technique

Con. =Conventional technique

Table 3 **Time of onset and incidence of positive blood aspiration**

time	closed mouth	conventional
< 1	21	8
1-5	19	40
>5	9	1
+ asp.	1	2

Table 4 **Injection pain**

Rating	Group 1		Group 2		Group 1 & 2	
	C.M.	Con.	C.M.	Con.	C.M.	Con.
Pain free	18	4	14	3	32	7
Mild	5	17	10	18	15	35
Moderate	1	3	1	4	2	7

C.M. = closed mouth technique

Con. = Conventional technique

Figure 5

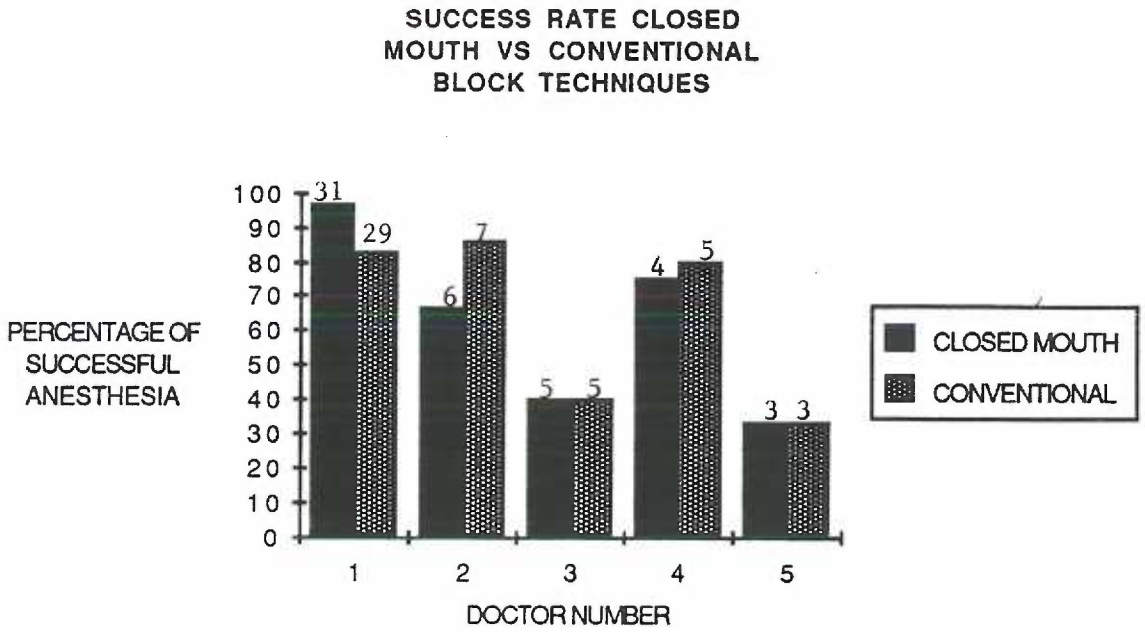


TABLE 5. **Frankel behavior scale**

Rating	Group 1		Group 2		Group 1 & 2	
	C.M.	Con.	C.M.	Con.	C.M.	Con.
(++)	9	9	17	18	26	27
(+)	10	9	6	5	16	14
(-)	5	6	1	1	6	7
(--)	0	0	1	1	1	1

C.M. = Closed mouth technique

Con. = Conventional technique

Table 6. procedures per technique

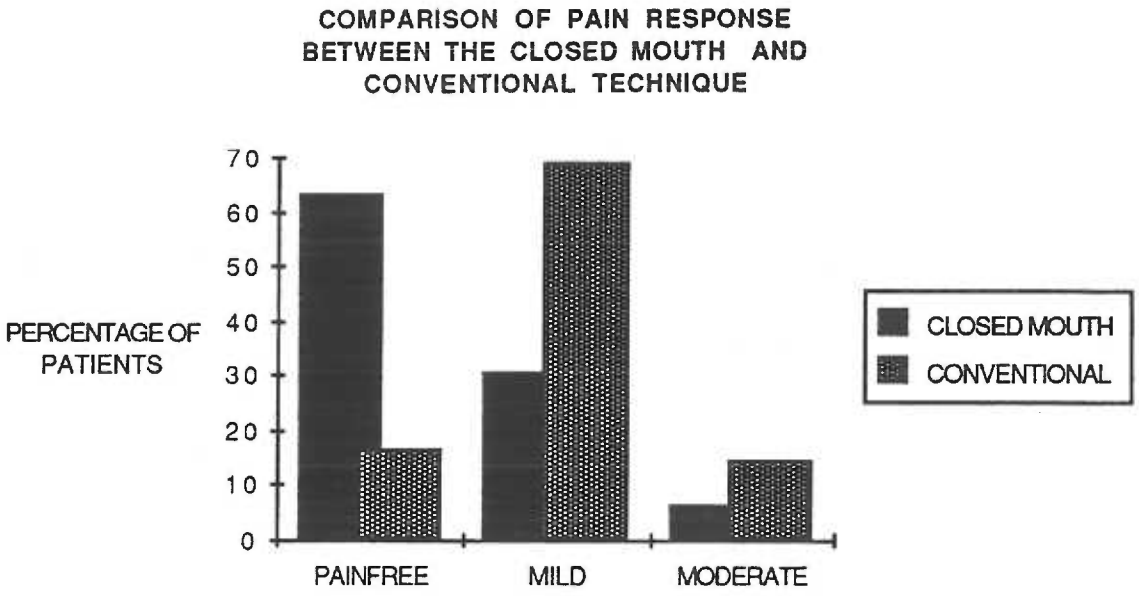
procedure	Closed mouth	Conventional
perm. restoration	20	20
perm. in direct pulp cap	1	0
perm. extractions	5	5
primary extractions	9	11
primary restorations	29	29
primary SSC	20	17
primary pulpotomy	13	10
primary SSC and distal shoe	1	0

Discussion

The closed mouth mandibular block technique has been stated to have equal or greater success rate to conventional nerve block techniques in adults. Possible advantages include faster rate of onset.less pain on injection, ease of administration [1],along with providing anesthesia of the inferior alveolar,lingual and buccal nerves with a single injection. However, Akinosi [1] stated that this technique was unreliable in children, possibly due to difficulty in determining proper penetration depth or predicting the flair of the mandible. In this investigation, the results concur with those stated by Vasarini and Sato , that this technique is equally eficatious in all age groups along with being significantly less painful. Our success rates , although higher than for the conventional mandibular nerve block technique were not significantly different. The incidence of buccal nerve anesthesia was consistent with that reported by Sisk [18]

The majority of the injections were administered by one clinician, who was relatively proficient in the closed mouth technique, his high success rate tended to offset the low success rates of two of the other clinicians, which were most likely artificially low due to the small number attempts of injection. (Fig. 6)

Figure 6



Summary

The findings of this investigation indicate that the closed mouth mandibular block technique is equally efficacious in children as in adults and significantly less painful as compared to conventional mandibular nerve block techniques.

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