

Aspiration in local anesthesia

Comparison between disposable self-aspirating and usual syringes

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The positive aspirations obtained with a self-aspirating syringe (Astra, Sweden) were compared with those obtained when aspiration was performed manually (Uniject® syringe, Hoechst, West Germany). The subjects were 1186 army recruits, to whom 2348 injections of local anesthetic were given in connection with dental treatment.

When aspiration was performed manually, the results were positive in 4.7% of the cases; with the self-aspirating syringe, they were positive in 1.1% of the cases. The total frequency of positive aspirations was significantly higher ($P < 0.001$) with the manual aspiration technique than with the self-aspirating syringe. The low frequency of positive aspiration obtained with the self-aspirating syringe was due to the fact that the value did not include aspiration occurring when the injection needle ruptured small blood vessels.

Key-words: Clinical dentistry; injection technique.

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The advisability of performing aspiration in connection with local anesthesia has often been emphasized (Harris, 1957, Schiano & Strambi, 1964, Bartlett, 1972). The fact that dentists do not routinely carry out aspiration has been at least partly due to the use of pre-filled cartridges of anesthetic solution, with which aspiration is not possible. In order to obviate the disadvantages of such cartridge-type syringes, a Swedish firm (Astra) developed a disposable, self-aspirating syringe for use with their cartridges of anesthetic solution (Evers, 1971). Flögel *et al.* (1973) reported that results obtained with the Astra syringe corresponded to those obtained by manual aspiration. The same investigators had noticed that

the mere fact that aspiration was performed and the results recorded, decreased the number of positive aspirations (Flögel, 1973). The purpose of this study was to compare the positive aspirations obtained with a self-aspirating syringe with those recorded when aspiration was carried out manually.

MATERIAL AND METHODS

The material consisted of 1186 healthy young army recruits, aged 18-24 years, who received 2348 injections of local anesthetic in connection with dental treatment. 867 recruits re-

ceived one injection, 619 received 2, and 81 three–five injections. The injection site was not the same on each occasion; the site was chosen according to the dental procedure in question. Because the same dentist gave all the injections in the same way in each place, it was assumed that the injections were comparable. The inferior alveolar nerve was anesthetized by block anesthesia; infiltration anesthesia was used elsewhere. Anesthesia was considered successful, if analgesia was achieved. Palatal anesthesia was not included in the statistics, because no positive aspiration results have been reported in this location (Schiano & Strambi, 1964).

During the injection the patient was half-sitting. Citanest-Octapressin® 3% (Astra, Sweden) was used in the self-aspirating syringes. All the injections with the self-aspirating syringe were given first. The subjects received only one injection (1.8 ml) at the same visit. Two different syringes were used, because the cartridges of the firms in question can only be used with their own syringes. Aspiration was performed manually with the Uniject® syringe of Hoechst (West Germany) and cartridges of Hostacain Forte Novum® 3% prepared by the same firm. A disposable, 27-gauge needle (Terumo®, Japan) was used in the syringe. Aspiration was recorded as positive if blood was clearly visible in the cartridge. For statistical comparison the test of equality of two hypothetical frequencies was used (Hald, 1952).

RESULTS

The percentages of positive aspirations recorded with the self-aspirating syringe in the various mode-region instances did not differ significantly from the total incidence (Table I), the total frequency of positive aspirations being 1.1%.

When aspiration was performed manually, a highly significantly larger frequency of positive aspirations was obtained for mandibular

block injections than for the other types of injections (Table I), i.e. 4.7%. The infiltration injections gave very few positive aspirations, except for teeth 17, 18, 27 and 28.

The total frequency of positive aspirations was higher ($P < 0.001$) when the plunger was operated manually than when a self-aspirating syringe was used. The difference was especially marked for mandibular block injections ($P < 0.001$).

DISCUSSION

The results obtained in the present study with manual aspiration are in agreement with earlier studies especially as regards the inferior dental block anesthesia (Goldman & Gray, 1963; Frye, 1963; Schiano & Strambi, 1964; Bartlett, 1972).

Much smaller amounts of blood were obtained with the self-aspirating syringe than with the conventional aspiration method, which must be due to the comparatively small aspiration (0.02 ml; Evers, 1971) in the self-aspirating syringe. This may explain the markedly lower percentages of positive aspirations recorded with this type of syringe. The difference is particularly clear in the case of mandibular block injections, where positive aspirations are most common. Thus the results of the present study do not agree with those reported by Flögel *et al.* (1973). They noticed that the mere fact of aspiration being carried out decreased the amount of positive aspirations towards the end of the experiment. However, in this experiment the Holchst cartridges, which gave the higher frequency of positive aspirations, were used last.

There are two different causes for positive aspirations. One type is due to tissue trauma caused by the injection needle; Small vessels are always ruptured when an injection is given. In these cases positive aspiration depends on the pressure caused by the withdrawal of the plunger and on the extent of the trauma. The other type of aspiration repre-

Table I. Frequency of positive aspirations of blood in different types of injections with self-aspirating and manually operated syringes

Type of injection	Type of syringe							
	Self-aspirating			Manual aspiration				
	Total no. of aspirations	Positive aspirations	P-value *	Total no of aspirations	Positive aspirations	P-value *		
	No.	%		No.	%			
Inferior dental block	315	8	2.5	< 0.06	280	37	13.2	< 0.001
Infiltration in the mandible	438	1	0.2	< 0.06	371	2	0.5	< 0.001
Infiltration in the region of 18, 17, 27, 28	177	6	3.4	< 0.03	114	9	7.9	< 0.12
Infiltration in other maxillary regions	403	—	0		250	—	0	
Total	1333	15	1.1		1015	48	4.7	

* Tested against the total value.

sents actual intravascular aspiration. If the needle penetrates large vessels, e.g. the mandibular artery, positive aspiration will always take place. This observation is contrary to the information of *Harris* (1957), according to which spontaneous aspiration requires a pressure of over 280 mmHg, if the pressure inside the mandibular artery is about 120 mmHg.

Persson et al. (1974) noticed in their study that side effects did not become more common when intravascular injection occurred. In their experiment the needle point was not repositioned when a positive aspiration was observed. This indicates that in part of the cases the aspirates were of extravascular origin.

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