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SHORT COMMUNICATION

AN INEXPENSIVE METHOD FOR FABRICATION OF INTRACEREBRO-VENTRICULAR CANNULAE FOR RATS

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Abstract: An inexpensive and simple method to fabricate intracerebroventricular (i.c.v.) cannulae for rats with readily available material is described here. The procedure is cost effective and quick. The cannulae thus designed are suitable for injecting minute quantities (µl) of drugs/chemicals interacerebroventricularly for acute or chronic experiments in rats.

Key words: intracerebroventricular cannula lateral ventricle rat

INTRODUCTION

Experimental manipulations of the brain often require adminstration of minute quantites of drugs/chemical agents intracerebroventricularly (i.c.v.), particularly for agents having poor pentrability across the blood brain barrier. Administration of such drugs/chemical agents requires the use of stereotaxic equipment in order to precisely deliver the drug into the right or the left lateral ventricle of the brain. The co-ordinates using bregma as reference for placement of the i.c.v. cannula are : 0·8 anteroposterior; 1·5 lateral and depth 4 mm from the surface of the skull. Such intraventricular cannulae are not readily available locally and prohibitive costs deter importing them. The procedure described here is simple, inexpensive, quick and is suitable for both acute and chronic experiments in rats.

METHODS

Materials required : (i) Discarded scalp vein set 21 or 22 g may be used (ii) thin stainless steel wire (diameter 0·47 mm) for stilette (iii) cutting pliers (iv) grinding stone (v) metal file (vi) cold sterilisation (Cidex solution, Johnson & Johnson).

Method : Fig. 1 shows the various steps involved in fabricating the guide cannula from discarded scalp vein set.

Step 1 : After cutting off the polythene tubing connected to a scalp vein set, the needle has the following components : a small upper portion of the needle covered with thin coloured plastic tubing approximately 1/2 cm in length (A) with holder plastic wings (B) attached below it and a long steel needle (C) protruding below the plastic covering with an external diameter of 0·825 mm.

Step 2 : The thin plastic covering (A) above the holder wing is cut and removed carefully with a scalpel blade to expose the guide cannula.

Step 3 : The holder wings (B) of the guide cannula are then cut off, flush with the plastic covering the latter serving as an anchor to the guide cannula. A steel wire, diameter 0·47 mm serves as the stilette is passed through the guide cannula.

Step 4 : A sufficient length of steel wire about 0·5 cms is allowed to protrude above the guide cannula, for subsequent handling during injection procedures. The lower portion of the guide cannula (C) below the plastic covering is then cut to a length of 4 mm along with the stilette.The vertical coordinate of the lateral ventricle is 4 mm from the surface of the skull. Thus the tip of the cannula, *in situ*, will be in position in the

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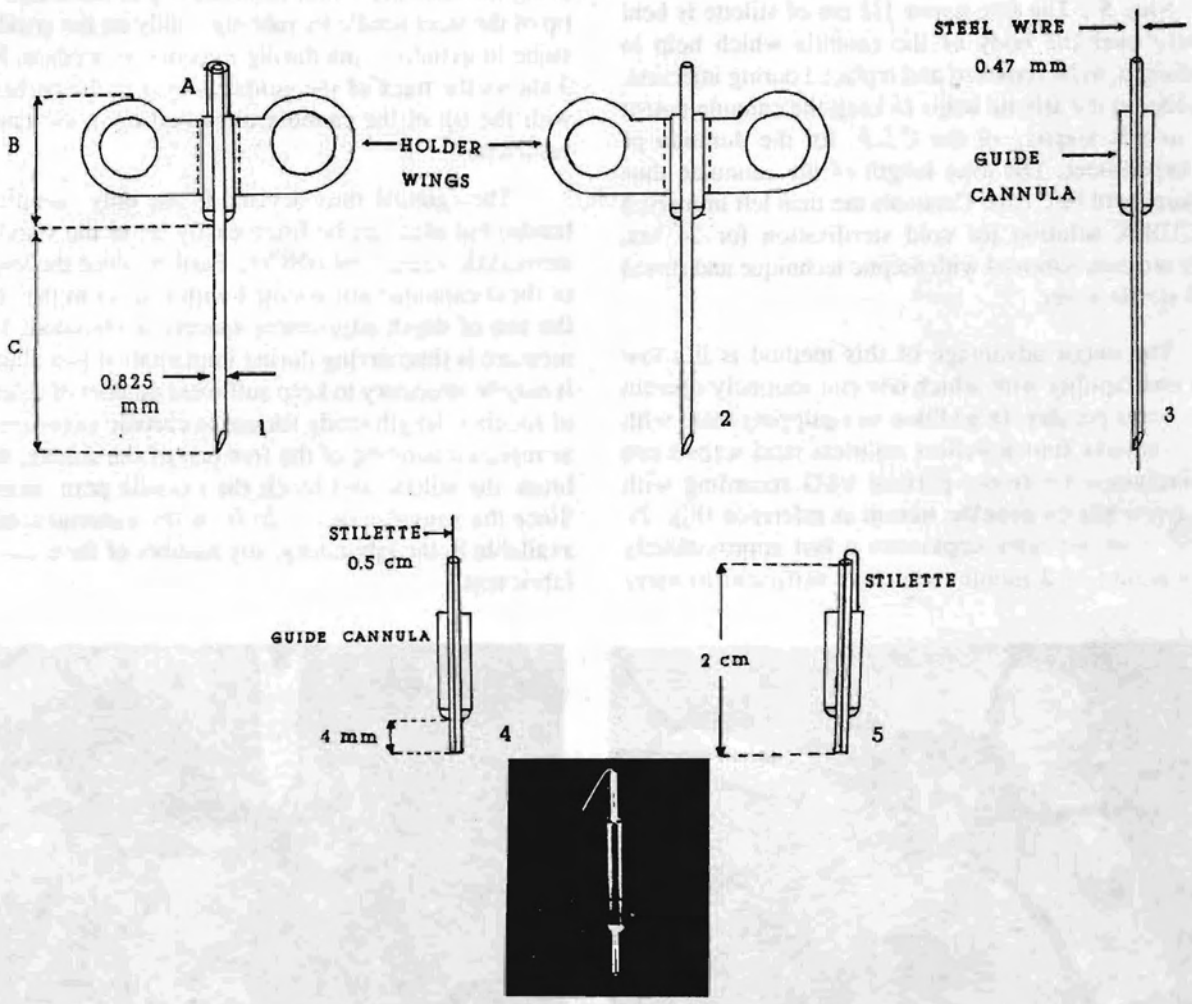

Fig. 1 : Steps 1-5 for fabricating the guide cannula.

Step 1 : Scalp vein set (cannula) with portions [A], [B] and [C].

Step 2 : Guide cannula without portion [A]

Step 3 : Guide cannula without portion [B]; with steel wire (stilette).

Step 4 : Guide cannula with steel wire (stilette) and portion [C] cut to 4 mm.

Step 5 : Completed guide cannula 2 cm long with stilette bent.

Photograph showing actual cannula.

lateral ventricle. The tip of the lower end is first rubbed on a metal file to open the bore of the needle and then lightly rubbed on a fine grinding stone, this step is necessary to smoothen the rough edges of the cannula in order to avoid trauma to brain tissue.

Step 5 : The free upper 1/2 cm of stilette is bent acutely over the body of the cannula which help in handling it, to be removed and replaced during injection. In addition the stilette helps to keep the cannula patent and avoids seepage of the C.S.F. for the duration of the experiment. The total length of the cannulae thus prepared will be 2 cms. Cannuale are then left immersed in CIDEX solution for cold sterilisation for 24 hrs. They are then removed with aseptic technique and rinsed with sterile water.

The major advantage of this method is it's low cost and rapidity with which one can routinely operate on 4-5 rats per day. In addition to equipping them with i.c.v. cannula, four jewellers stainless steel screws can be implanted for fronto-parietal EEG recording with one screw placed over the nasion as reference (Fig. 2). These cannuale after implantation last approximately for a period of 2 months which is sufficient to carry out short term studies. The volume of the drug/chemical to be injected is restricted to 5-10 µl. This can be easily done either by using a standard HAMILTON syringe or by using a 26 G steel needle cut exactly to match the length of the guide cannula. However, while using the latter, it would be necessary to smoothen the tip of the steel needle by rubbing gently on the grinding stone to avoid trauma during injection procedure. Fig. 3 shows the track of the guide cannula in the rat brain, with the tip of the cannula track ending in the lateral ventricle.

The cannula thus devised is not only simple to handle but also can be fitted easily on to the standard stereotaxic equipment [INCO]. Further, since the length of these cannulae are oriented with respect to the skull the use of depth adjustment spacers is obviated. This measure is time saving during implantation procedures. It may be necessary to keep sufficient number of stilettes of required length ready for use in chronic experiments as repeated bending of the free end of the stilette, may break the stilette and block the cannula permanently. Since the cannulae are made from the material readily available in the laboratory, any number of them can be fabricated.

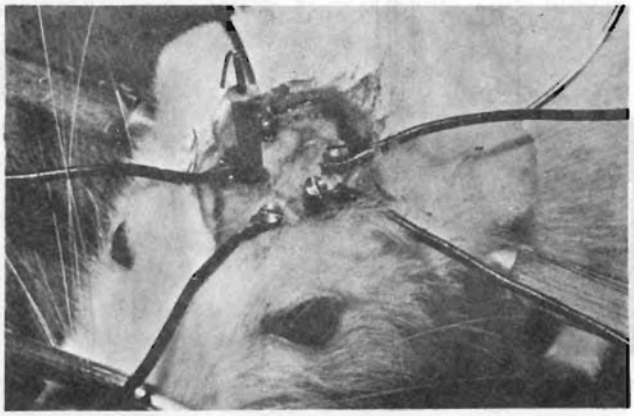

Fig. 2 : **Anaesthetized rat mounted in stereotaxic instrument with** the implanted i.c.v. cannula and stilette in situ. Four parietal and preoccipital screws are for EEG monitoring. The ground is affixed to the nasion. Dental cement has not been applied in order to show the relation of coronol and saggital sutures and bregma to the site of the i.c.v. cannula.

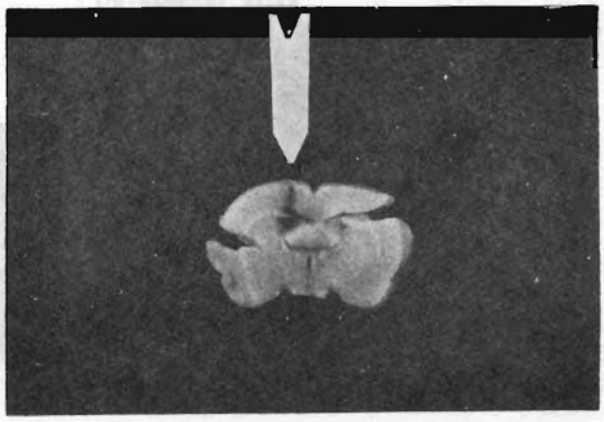

Fig.3 : Section of rat brain showing site of cannula track penetrating through the cerebral cortex into the lateral ventricle. Alcian blue dye 10 µl has been injected i.c.v. and infiltration of the dye (stained track) is well seen. The track of the guide cannula shown by arrow.

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