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Intra-Arterial Infusion Catheters with Implantable Injection Chambers in Maxillo-Facial Oncology

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Introduction

Regional intra-arterial chemotherapy in the treatment of maxillo-facial tumours is used with curative intent in combined chemotherapy and radiotherapy (Kreidler and Petzel, 1983; Szepezi et al., 1984; Goepfert et al., 1973), in palliative treatment schedules (Sullivan et al., 1961; Freckman, 1972; Donegan and Harris, 1973), or in induction chemotherapy protocols to reduce the size, extent and viability of advanced tumours (Gollin and Johnson, 1971; Bilder and Hornova, 1970; Snow and Sindram, 1973; Richard et al., 1974; Nervi et al., 1978; Curioni and Quadu, 1978; Szabo and Kovacs, 1979; Molinari, 1985).

Problems with catheter infections are frequently seen during long term local intra-arterial chemotherapy regimes (Szabo and Kovacs, 1979), and are mostly due to contamination of the infusion system used. We therefore advocate intra-arterial infusion with an implantable intra-arterial infusion catheter (Implantofix®, Braun, Melsungen). An innovation in the use of these catheters in the maxillo-facial region is presented.

Technique

The implantation technique is usually performed under general anaesthesia.

The kind of intubation depends on the site and/or extent of the tumour. When possible, we prefer nasotracheal intubation with a pericranial fixation of the tube (Hernández Altemir, 1986), leaving the mouth, face, neck and temporo-mastoid regions exposed on both sides (Fig. 1) (in the event of bilateral catheterization).

In the majority of cases we used a retrograde cannulation technique through the parietal branch of the superficial temporal artery. If the external carotid artery could not be catheterized via the superficial temporal artery a retrograde cannulation technique via the facial temporal artery was used. Three incisions are used, are in the pre-auricular, the second in the retroauricular and the third in the sub-mastoid region (Figs. 2 and 3).

Depending on the site and size of the tumour, the tip of the catheter is placed in the external carotid artery just caudal to the branches perfusing the tumour area.

The insertion of the catheter tip into the external carotid

Summary

An intra-arterial chemotherapy procedure in patients with malignant tumours in the oral and maxillo-facial region which, from the vascular point of view, can be dependent on the external carotid artery and/or its branches is presented. Particularly for the prevention of catheter infection, obstruction, etc., a subcutaneous pouch, connected to the infusion catheter, is implanted subcutaneously in the submastoid region.

Key-Words

Maxillo-facial tumour – Intra-arterial chemotherapy – Implantation of catheter

artery, the path of the catheter over the temporal surface around the ear down to the mastoid region, and the insertion of the implantable drug injection chamber at the end of the catheter are carried out before the actual catheterization procedure. The dissection of the superficial temporal artery is made through a preauricular incision (Kreidler and Petzel, 1983; Bilder and Hornova, 1970) (Fig. 1). This

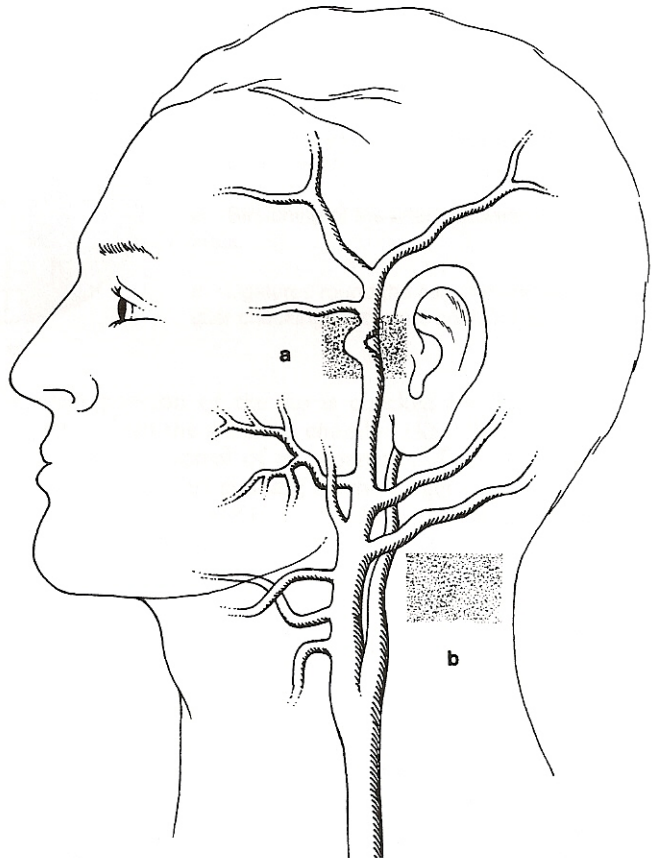


Fig. 1 Perfusion area of the A. carotis externa.

- The greatest curvature of the vessel is found in the sub-zygomatic region.
- Region of the subcutaneous pouch for the implantable injection chamber.

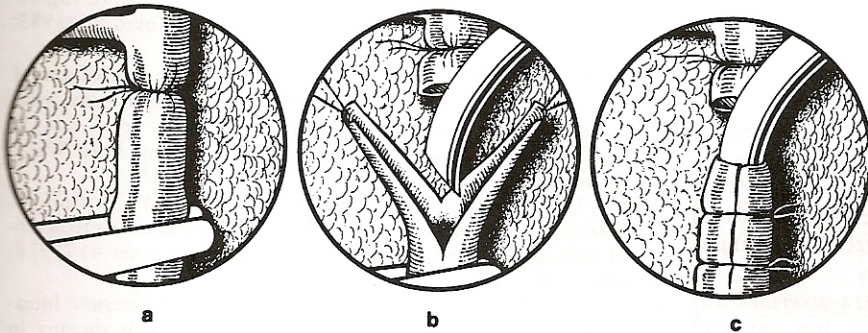
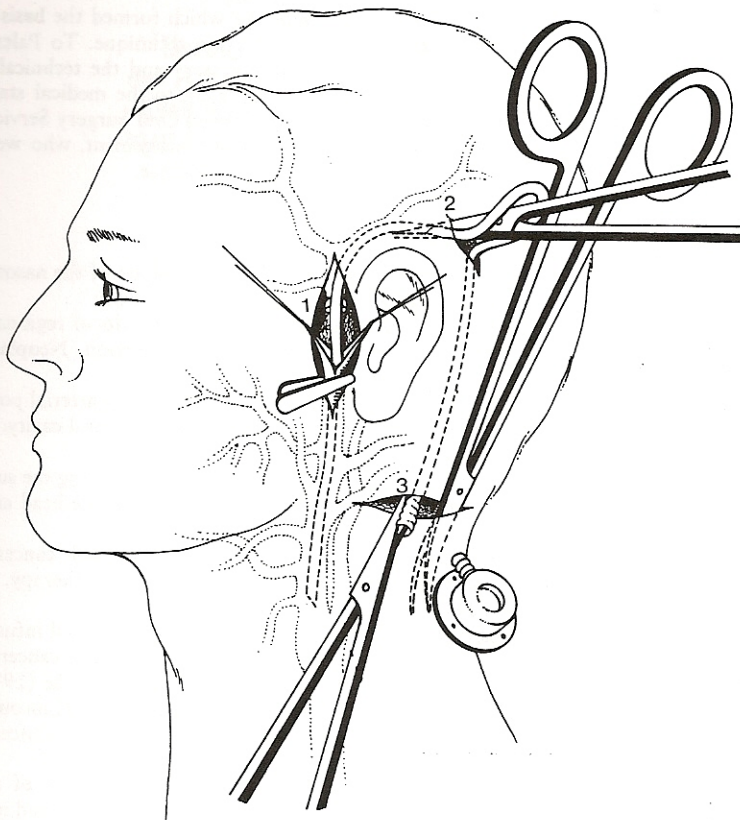


Fig. 2

- 1 Pre-auricular incision.
- 2 Retro-auricular incision.
- 3 Submastoid incision.
- a Ligation/clamping of the superficial temporal artery and the longitudinal incision in between.
- b Stretching of the artery between ligatures.
- c Ligatures round the catheter and artery after checking for correct positioning.

artery usually lies in front of or under the accompanying vein and auriculotemporal nerve, which can be preserved in the majority of cases.

The artery must be freed as far caudally as possible because the greatest curvature of the vessel is found in the subzygomatic region. After ligating collateral vessels, elevation of the superficial temporal artery is simple and the chance of perforation by the catheter in the sub-zygomatic area is minimized.

The superficial temporal artery is ligated cranial to the preauricular incision (Fig. 2. a) and clamped caudally as atraumatically as possible.

Through a 1 cm. longitudinal incision (Fig. 2 a), sutures are passed through and knotted. After cutting the vessel above the knots, the caudal part of the artery can be stretched between ligatures (Fig. 2 a, b), and the bevelled catheter tip can easily be introduced into the vessel, although advancement of the catheter is not always easy because of anatomical variations (Snow, 1966). The catheter and the implantable drug injection chamber are flushed with a heparinized saline solution before the catheterization procedure.

The correct position of the tip is checked by disulphine blue injection into the injection chamber (Kreidler and Petzel, 1983). After control of the correct catheter tip position by disulphine blue staining of the target area, two ligatures are placed below the entry side of the catheter into the cannulated vessel. The catheter is fixed to the temporal fascia by a ligature.

Via a retro-auricular incision, a supra-auricular tunnel is dissected over the temporal fascia to the pre-auricular region (Fig. 2). A retro-auricular tunnel to the mastoid region is created through the same incision.

The drug injection chamber is temporarily removed from the distal part of the catheter, and the catheter can then be pulled through the upper and lower tunnels with a curved haemostat. Using blunt dissection, a subcutaneous pouch is prepared in a cervico-lateral direction (Fig. 2). The implantable drug injection chamber is fixed over the sternocleido-mastoid muscle.

During suturing, attention must be paid to the position of the catheter in order to avoid kinks or perforation with the suture needle.

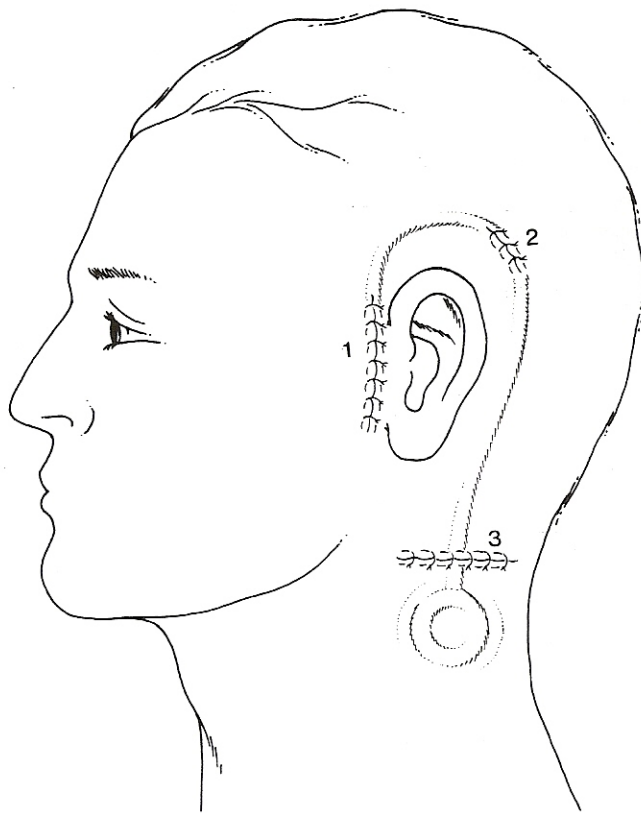


Fig. 3 Preauricular subcutaneous course of the catheter, and the tunnels behind the ear to the subcutaneous pouch for the drug infusion chamber.

The procedure can be done bilaterally in the same session if the tumour crosses the midline.

In our department we start with the chemotherapy schedule 5 days after the cannulation, although some authors (Kreidler and Petzel, 1983) start the day after the cannulation procedure.

It must be stressed that the implantable intra-arterial infusion catheters are suitable not only for intra-arterial "pulse" administration of cytostatic agents, but also for "intermittent continuous" intra-arterial infusion. In our department we use a perfusor for the administration of the drugs.

Conclusions

Catheterization of the external carotid artery has been used by many authors since Sullivan et al. (1953) introduced the technique, and is now a common procedure. In head and neck oncology, the use of intra-arterial infusion catheters with implantable injection chambers is an improvement, reducing the infection rate associated with the catheter, which always necessitates its removal and leads to delay of the therapy schedules. The technique improves patient comfort and facilitates intra-arterial chemotherapy.

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