NATIONAL INSTITUTE FOR CLINICAL EXCELLENCE

INTERVENTIONAL PROCEDURES PROGRAMME

Interventional procedures overview of supraorbital minicraniotomy for intracranial aneurysm

Introduction

This overview has been prepared to assist members of the Interventional Procedures Advisory Committee advise on the safety and efficacy of an interventional procedure previously reviewed by SERNIP. It is based on a rapid survey of published literature, review of the procedure by Specialist Advisors and review of the contents of the SERNIP file. It should not be regarded as a definitive assessment of the procedure.

Date prepared

This overview was prepared in December 2002.

Procedure names

- Supraorbital minicraniotomy for intracranial aneurysm.
- Synonym: frontolateral keyhole craniotomy.

Specialty societies

- *Society of British Neurological Surgeons.*

Description

Indications
Aneurysms within the front and middle parts of the skull (the anterior, middle and pituitary fossae).

Aneurysms are dilated portions of blood vessels that may rupture, causing stroke. They are relatively rare.

This surgical approach may also be used for tumours in the front and middle parts of the skull including tumours of the cranial nerves, the pituitary, or the outer covering of the brain (the meninges). The prognosis varies according to the site of the tumour and its rate of growth.

Summary of procedure

The traditional surgical approach to aneurysms in the front and middle parts of the skull is through a large cut in the bone to expose a large section of the brain surface. Aneurysms are usually clipped to separate them from the blood vessel they arise from. If clipping is not possible, the aneurysm is wrapped with synthetic material to reduce the risk of rupture.

Supraorbital minicraniotomy is a minimally invasive approach through a skin incision between 3 and 10 mm long, made above the eyebrow. A cut about 20 mm by 30 mm

is made in the skull. The aneurysm is then clipped or wrapped using conventional microsurgical instruments.

The claimed advantages of supraorbital minicraniotomy are: quicker operation; better cosmetic outcome; reduced risk of damage to nerves and arteries; and reduced risk of infection.

Literature review

Appraisal criteria

Studies on supraorbital minicraniotomy for intracranial aneurysms that examined clinical outcomes were included.

List of studies found

No controlled studies were found.

Seven case series were found. The table give details of three largest case series.[1-3]

References to smaller studies are given in Appendix A.

Table 1 Summary of key efficacy and safety findings (1)

Study details	Key efficacy findings	Key safety findings	Key reliability and validity issues
Van Lindert E[1] Case series Mainz, Germany 1989 to 1995 139 people intracranial aneurysms (197 aneurysms), average age 49 (range 15-74) Inclusion/exclusion criteria: not stated Follow up: time not stated	• aneurysm clipped: 94% aneurysms • aneurysm wrapped: 6% aneurysms	• rupture of aneurysms during surgery: 4 people • further craniotomy for inaccessible multiple aneurysms: 4 people	Uncontrolled case series.
Czirják S[2] Case series Budapest, Hungary Date not stated (published 2001) 102 people with intracranial aneurysms (77 single; 25 multiple), age not stated Operated on: • within 48 hours of rupture: n = 56 • between 48 hours and 8 days of rupture: n = 24 Inclusion/exclusion criteria: not stated Follow up: time not stated	• aneurysm clipped: 100/102 • aneurysm wrapped: 2/102	• rupture of aneurysms during surgery: 2 people • death within 8 days: 4 people • 'central nervous system infection': 2 people • impaired CSF circulation requiring ventriculoperitoneal shunts: 7 people	Uncontrolled case series. Also described supraorbital minicraniotomy for treating tumours.

Study details	Key efficacy findings	Key safety findings	Key reliability and validity issues
Paladino J[3] Case series Croatia 1996 to 1998 37 people with intracranial aneurysms, age range 12 to 63 Operated on: • within 48 hours of rupture: n = 3 • between 48 hours and 53 days of rupture: n = 34 Follow up: up to 17 months	Good recovery on Glasgow outcome scale: 33/37 Cosmetic effects: 'good'	• deaths: none • damage to supraorbital nerve: 4 people • intraoperative rupture of carotid artery aneurysm: 1 person • wound infection: 1 person	Small uncontrolled case series. Follow up long for some people. Outcomes appropriate.

Validity and generalisability of the studies

- The studies were carried out in settings appropriate to the UK.
- Case series only were found. This study design cannot show whether supraorbital minicraniotomy is safer or more efficacious than conventional approaches. Follow up length was stated in only one report.[3]

Bazian comments

- The procedure refers only to the surgical technique for gaining access to the aneurysm or tumour, not the treatment itself.

Specialist advisors' opinions

Specialist advice was sought from the *Society of British Neurological Surgeons.*

- This is a modification of a standard surgical approach.
- Not ever really been accepted into mainstream practice.
- Interventional radiology techniques have superseded it.
- More difficult to deal with intraoperative rupture.
- Very few aneurysms will be treated surgically in the future (about 2%).

Issues for consideration by IPAC

None other than those discussed above.

References

1. van Lindert E, Perneczky A, Fries G, Pierangeli E. The supraorbital keyhole approach to supratentorial aneurysms: concept and technique. *Surgical Neurology* 1998; 49: 481–89.

2. Czirjak S, Szeifert GT, Day JD, George B, et al. Surgical experience with frontolateral keyhole craniotomy through a superciliary skin incision. *Neurosurgery* 2001; 48: 145–50.

3. Paladino J, Pirker N, Stimac D, Stern-Padovan R. Eyebrow keyhole approach in vascular neurosurgery. *Minimally Invasive Neurosurgery* 1998; 41: 200–3.

Appendix A: References to studies not described in the table

Reference	Number of study participants
Czirjak S, Nyary I, Futo J, Szeifert GT. Bilateral supraorbital keyhole approach for multiple aneurysms via superciliary skin incisions. *Surgical Neurology* 2002; 57: 314–23.	36 (likely to be also included in Czirjak[2])
Menovsky T, Grotenhuis JA, De Vries J, Bartels RH. Endoscope-assisted supraorbital craniotomy for lesions of the interpeduncular fossa. *Neurosurgery* 1999; 44: 106–10.	16
Fernandes YB, Maitrot D, Kehrli P, Tella OI, Jr., et al. Supraorbital eyebrow approach to skull base lesions. *Arquivos de Neuro-Psiquiatria* 2002; 60: 246–50.	6
Fernandes YB, Maitrot D, Kehrli P. Supraorbital minicraniotomy. *Skull Base Surgery* 1997; 7: 65–8.	5

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