

# 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 (IPAC) 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 by Bazian Ltd in December 2002.

#### ***Procedure names***

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

#### ***Specialty societies***

- *Society of British Neurological Surgeons.*

#### ***Description***

##### **Indications**

Aneurysms in the brain.

Aneurysms in the brain (cerebral aneurysms) are small balloon-like dilated portions of blood vessels that may occasionally rupture, causing brain haemorrhage, stroke, or death. Therapy is designed to support recovery from the initial bleed, together with specific treatment to prevent re-bleeding.

The majority of cerebral aneurysms arise from the major blood vessels in the centre of the head as they cross the space between the skull and the brain (subarachnoid space). The standard surgical approach to this area is through an incision in the scalp just in front of the ear, and an opening in the underlying bone on the side of the head, to approach the abnormal vessels side-on in the subarachnoid space beneath the brain. The surgical treatment of cerebral aneurysms involves placing a permanent clip across the origin of the weakness (effectively closing the neck of the balloon) to separate it from the normal vessel, whilst preserving blood flow to the brain. If clipping is not possible, the aneurysm may be reinforced by wrapping it with synthetic material to reduce the risk of rupture.

## **Summary of procedure**

Supraorbital minicraniotomy is an alternative approach through a smaller incision made above the eyebrow and through the underlying skull, allowing a front-on approach to the area of abnormality. 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.<sup>1-3</sup>

References to smaller studies are given in Appendix A.

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

<b>Study details</b>	<b>Key efficacy findings</b>	<b>Key safety findings</b>	<b>Key reliability and validity issues</b>
<p><b>Van Lindert E<sup>1</sup></b></p> <p>Case series</p> <p>Mainz, Germany</p> <p>1989 to 1995</p> <p>139 people intracranial aneurysms (197 aneurysms), average age 49 (range 15-74)</p> <p>Inclusion/exclusion criteria: not stated</p> <p>Follow up: time not stated</p>	<ul style="list-style-type: none"> <li>• aneurysm clipped: 94% aneurysms</li> <li>• aneurysm wrapped: 6% aneurysms</li> </ul>	<ul style="list-style-type: none"> <li>• rupture of aneurysms during surgery: 4 people</li> <li>• further craniotomy for inaccessible multiple aneurysms: 4 people</li> </ul>	<p>Uncontrolled case series.</p>
<p><b>Czirják S<sup>2</sup></b></p> <p>Case series</p> <p>Budapest, Hungary</p> <p>Date not stated (published 2001)</p> <p>102 people with intracranial aneurysms (77 single; 25 multiple), age not stated</p> <p>Operated on:</p> <ul style="list-style-type: none"> <li>• within 48 hours of rupture: n = 56</li> <li>• between 48 hours and 8 days of rupture: n = 24</li> </ul> <p>Inclusion/exclusion criteria: not stated</p> <p>Follow up: time not stated</p>	<ul style="list-style-type: none"> <li>• aneurysm clipped: 100/102</li> <li>• aneurysm wrapped: 2/102</li> </ul>	<ul style="list-style-type: none"> <li>• rupture of aneurysms during surgery: 2 people</li> <li>• death within 8 days: 4 people</li> <li>• 'central nervous system infection': 2 people</li> <li>• impaired CSF circulation requiring ventriculoperitoneal shunts: 7 people</li> </ul>	<p>Uncontrolled case series.</p> <p>Also described supraorbital minicraniotomy for treating tumours.</p>

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

### **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.<sup>3</sup>

### ***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 consultants who have been nominated or ratified by their Specialist Society or Royal College.

- 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.

## **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. <i>Surgical Neurology</i> 2002; 57: 314–23.	36 (likely to be also included in Czirjak <sup>2</sup> )
Menovsky T, Grotenhuis JA, De Vries J, Bartels RH. Endoscope-assisted supraorbital craniotomy for lesions of the interpeduncular fossa. <i>Neurosurgery</i> 1999; 44: 106–10.	16
Fernandes YB, Maitrot D, Kehrl P, Tella OI, Jr., et al. Supraorbital eyebrow approach to skull base lesions. <i>Arquivos de Neuro-Psiquiatria</i> 2002; 60: 246–50.	6
Fernandes YB, Maitrot D, Kehrl P. Supraorbital minicraniotomy. <i>Skull Base Surgery</i> 1997; 7: 65–8.	5