

CRANIOPLASTY PROSTHESIS: A PRELIMINARY REPORT OF A METHOD AIMING AT ACCURATE PRE-OPERATIVE CONSTRUCTION

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Over the past year we have adopted a new method, described below, whereby the cranioplasty prosthesis is fashioned pre-operatively. Roentgenograms are used in conjunction with the old method of positive and negative impressions with plaster-of-paris to aid in the preparation of the 'plates', which are made of acrylic. The procedure is as follows:

The scalp is shaved. A ring marker, 1 cm. in diameter, is stuck down to the skin over the centre of the defect. Two linear markers are placed near the border of the defect (Fig. 1). A Schonander skull table is used in taking the X-rays.

The patient's head is positioned so that the central X-ray passes through the centre of the ring marker. The patient is told to press down against the table to ensure that the rim of the defect is as close to the cassette as possible. Three X-rays are taken in the same position with varying exposure factors.

The skull defect and markers on the X-ray are outlined

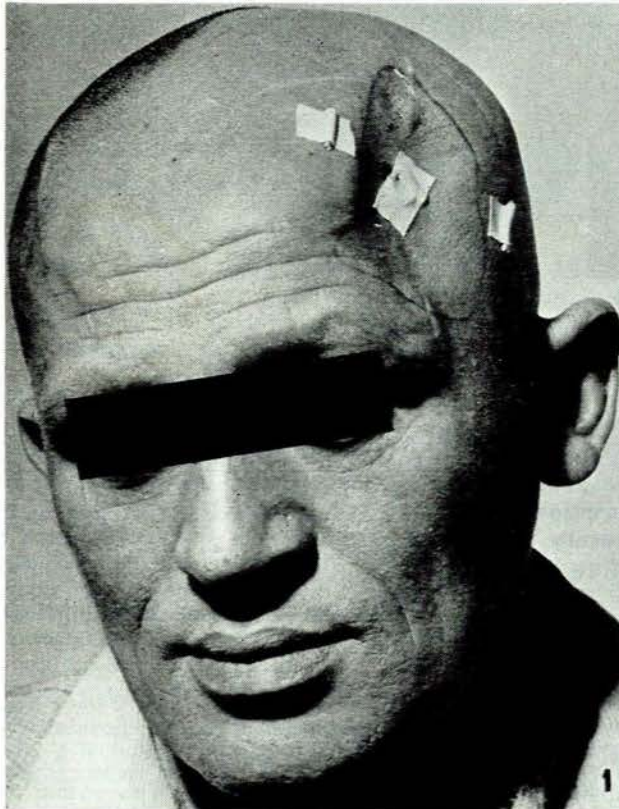


Fig. 1. Patient with skull defect outlined and markers in position.

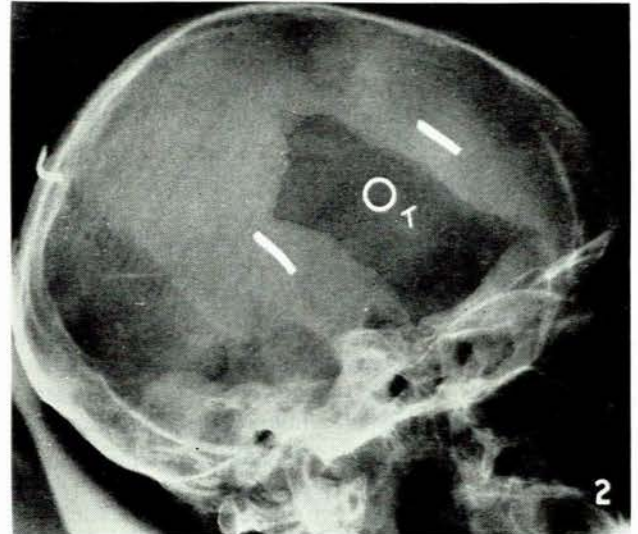


Fig. 2. Same case as Fig. 1. X-ray picture of skull defect and markers.

in pencil (Fig. 2), and traced onto greaseproof paper. The diameter of the ring marker is measured on the X-ray, and the factor of magnification (if any) is determined. If magnification is present, a pantograph is used to reduce the defect to actual size.

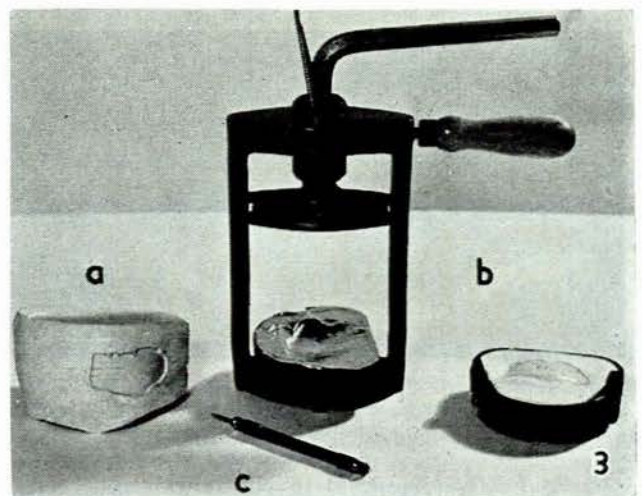


Fig. 3. Different case to Fig. 1. (a) Positive cast with defect shallowed out. The position of the markers cannot be seen on the photograph. (b) Opened two-piece flask filled with plaster-of-paris. The left half is lined with tin foil and the right half contains the prosthesis. (c) Scriber.

The edge of the defect is delineated on the skin with indelible pencil as accurately as possible (Fig. 1). The skin is then coated with oil.

With dental impression plaster, a cast is made of the marked area, including enough of the surrounding bony contour to determine the shape of the skull. If the defect is a large one, the comparative normal side is included in the impression.

The pattern made from the X-ray plate is affixed to the cast in the area circumscribed by the pencil marking. Care is taken to align the markers on the tracing with those on the cast. Then the true border of the defect is furrowed with a scribe (Fig. 3c).

A positive cast, made with dental model stone, is formed from this negative, and the furrowed line is shown as a raised edge. The area within this raised border is shallowed out evenly to a depth equivalent to the estimated thickness of the skull (Fig. 3a). The depression is filled with dental (paraffin) wax and smoothed to fit the curvature of the rest of the cast.

The matrix is invested in soft 'wet' plaster-of-paris contained in one half of a two-piece flask. Excess plaster is trimmed from the borders of the matrix.

When the plaster has set, a separating medium is applied to the surface of the plaster, and the other half of the two-piece flask is filled with plaster-of-paris. The unit is secured.

After the plaster has set, the flask is opened, and the wax matrix is eliminated by boiling. One side of the flask is coated with a plaster-separating medium ('Cold Mould Seal'). Clear acrylic is then introduced into the cavity left after the wax matrix has been eliminated.

Once cured, the acrylic plate is cleaned, holed (for securing plate to skull and dura) and polished (Fig. 4). It is then replaced in the curing flask, and both sides lined

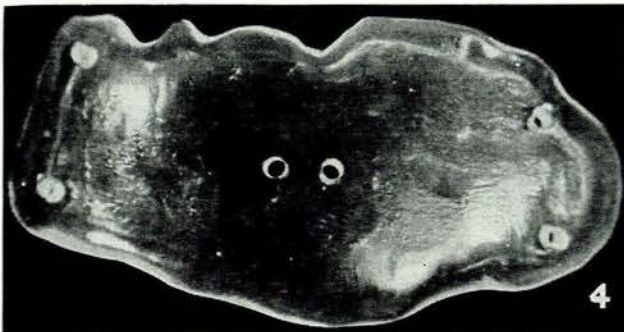


Fig. 4. Polished prosthesis, 'holed' and ready for autoclaving. Lately we have been grooving the edge, from the hole to the rim, to accommodate the securing wire.

with tin foil (gauge .0006) to allow for acrylic lost in polishing (Fig. 3b).

The clamped flask is sent for autoclaving, and the prosthesis is not removed until the flask is cooled in sterile water, to prevent warping of the plate. (The flask is

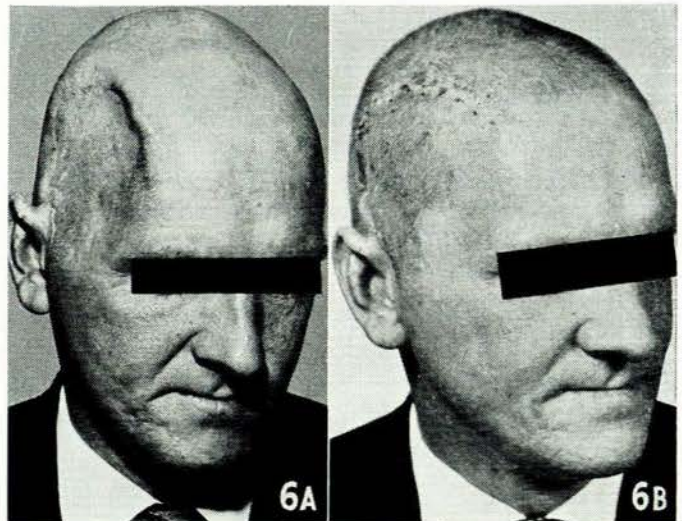


Fig. 5A. Frontal bone excised for osteitis following frontal sinusitis.

Fig. 5B. Four days after cranioplasty.

Fig. 6A. Excised right fronto-parieto-temporal depressed fracture.

Fig. 6B. Six days after cranioplasty.

opened only when the defect has been exposed at operation.)

The prosthesis is now ready for use.

To date, 12 cranioplasties have been performed with this technique. No sepsis has been reported. The operation is simplified and the cosmetic results are gratifying.

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