Management of depressed skull fracture in the newborn

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The authors describe three cases of neonatal depressed skull fracture subsequent to
difficult delivery, treated without surgical elevation. None of the patients developed
neurological deficits, cosmetic deformity or electroencephalographic signs of epilep-
tiform activity. Neonatal depressed skull fractures not associated with focal
neurological signs may not require surgical therapy; we are not certain what the ab-
olute criteria for operation should be.

KEY WORDS • depressed skull fracture • birth trauma • spontaneous skull fracture elevation

Patients with depressed skull fractures
associated with birth trauma are rou-
tinely referred to a neurosurgeon for
elevation of the depressed bone. Without em-
pirical evidence, the standard texts have
described clinically significant depression as
greater than 5 mm or greater than the local
skull thickness.1-5,7,8 While there are well-
recognized complications of depressed fra-
ture, it is not apparent that any of the poten-
tial sequelae are eliminated by this operation.3
We wish to describe three patients whose
depressed fractures spontaneously elevated
and who did not develop seizures, neurological
deficit or cosmetic deformity.

Case Reports

Case 1

A 3600-gm baby boy was born to a 30-
year-old woman after 7 hours of labor. This
was the mother's second child. The infant
head engaged in a face presentation, which
required flexion and manual rotation with low
forces to an occiput posterior presentation.
Initial physical examination revealed an alert,
active infant with chin and facial contusions,
generalized petechiae, a palpable indentation
of the right parietal bone, and a right facial
nerve paralysis. No other neurological abnor-
malities were noted.

The infant was followed as an outpatient.
By 17 days, both the facial palsy and the visi-
ble skull deformity had improved. X-ray films
at 21 days continued to show a depressed
parietal skull fracture (Fig. 1). The facial
palsy resolved by 1 month of age; the depres-
sion of the right parietal bone was still
palpable. At 3 months, the physical examina-
tion was normal. Skull x-ray films at 3½
months (Fig. 2) demonstrated nearly com-
plete restoration to normal, with a faint
radiodensity seen on the AP film underlying
the right parietal region. Skull films and an
electroencephalogram (EEG) taken at 2 years
Depressed skull fracture in the newborn

Case 1

A 2647-gm baby girl was born to a 26-year-old woman after a 36-week gestation. The mother had previously had two abortions. The delivery was difficult, with low forceps rotation from right occiput transverse to right occiput anterior presentation.

The initial physical examination revealed severe molding of the head, overriding sutures, a palpable depression of the right parietal bone, and generalized hypotonia which lasted for several days. Head circumference at birth was 31 cm. An EEG on the fourth day of life showed focal slowing in the right temporal area. The cerebrospinal fluid contained 1400 red blood cells/cu mm and 12 white blood cells/cu mm. Skull films revealed a depressed skull fracture in the right parietal-temporal region. No operation was performed.

Examination 2½ years later revealed a normal neurological development; the skull was symmetrical and without focal depression in the right parietal region. Skull films and EEG at that time were normal.

Case 2

A 3960-gm baby girl was born to a 19-year-old woman after a normal gestation. This was the mother's first child. Forceps were utilized because of cephalopelvic disproportion. An obvious right frontal depressed fracture was seen and palpated. Neurological examination was normal at birth. Within one day the depressed fracture spontaneously elevated and was not treated in any way. At 1 year of age, the child was neurologically normal. Growth and development had been unremarkable; skull radiographs and EEG were appropriate for her age.

Discussion

"Treatment consists in surgical elevation of the depressed bone; these fractures do not reduce themselves spontaneously." This viewpoint, expressed by one of the standard texts of pediatric neurosurgery, has been repeated in most subsequent treatises on the subject of neonatal depressed skull fractures. Yet no studies are reported supporting the contention that a depressed fracture cannot spontaneously elevate; nor is there evidence that the sequelae of a fracture which is not surgically elevated will be more significant to the child. In fact, there may be hazards from the surgical repair which could increase the risk of death or disability.

We have presented three patients whose depressed fractures spontaneously elevated. None of the children had seizures or neurological deficit. Natelson and Sayers reported a similar outcome in one of 15

Fig. 1. Case 1. Skull films at age 3 weeks. Towne projection (left), and right lateral projection (right).
patients with neonatal depressed skull fracture; the other 14 had surgical elevation at the time of diagnosis. We wonder how many infants would spontaneously elevate their depressed skull fractures if given the opportunity.

Open surgical repair is not the only method which has been used successfully to elevate a depressed infant skull fracture. Raynor and Parsa\(^5\) reported a patient whose depressed fracture was elevated by digital pressure on the skull, and Schrager\(^6\) described an infant whose fracture was elevated with a breast pump applied to the scalp. Neither infant had subsequent cosmetic deformity, seizures or neurological deficit. We do not know how many other depressed fractures have been treated by similar methods; nor do we know the percentage of successful elevations.

The benefits of surgical elevation must be clearly recognized. As Natelson and Sayers have documented, depressed fractures are sometimes associated with hematomas in the epidural, subdural or intracerebral spaces.\(^4\) Significant neurological deficits are usually noted with these associated lesions. Surgical therapy certainly is required to evacuate these life-threatening mass lesions. Dural tears, which do predispose to fixed neurological signs, seizures and the development of post-traumatic arachnoid cysts should be surgically repaired. It is not usually possible to determine the status of the dura by physical examination. Certainly the magnitude of the depression and location of indriven bone fragments seen on x-ray films will assist in this phase of the evaluation. Surgical elevation is not without its hazards, too.

We tentatively propose that it is not necessary to surgically elevate all depressed fractures caused by birth trauma. Indications for surgery should be: 1) x-ray evidence of bone fragments within the cerebrum, 2) associated neurological deficits, 3) signs of increased intracranial pressure, 4) signs of CSF beneath the galea, 5) failure to elevate the fracture by closed manipulation, and 6) recognized problems achieving long-term follow-up.

Factors which tend to reduce the indications for surgical elevation are: 1) minimal depression (less than 2 cm), 2) depression over a major venous sinus without signs of cerebral dysfunction or increased intracranial pressure. We do not know the natural history of depressed skull fractures in the neonatal period. It is, therefore, difficult to be certain of appropriate therapies.

References


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