CONDUCTIVE DEAFNESS FOLLOWING HEAD INJURY*

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Deafness is a not uncommon complication of head injury. In the majority of cases the deafness is perceptive in type but a conductive hearing loss may occur. Disruption of the ossicular chain producing a conductive hearing loss is now a well recognized complication of head injury, although it is only in the past few years that cases have been reported (Thorburn, 1957; Gisselsson, 1958; Bouche and Richard, 1960; Seltzer, 1962; Ballantyne, 1962). This is partly due to the development of the tympanotomy approach for the exploration of the middle ear, which has simplified the investigation and treatment of these cases. It seems probable too that the condition is being seen more frequently with the rise in the numbers of road accidents.

The injury most commonly found is a dislocation of the incus, but the other ossicles may be involved and dislocation of the malleus is described in this series and an avulsion of the stapes has previously been described (Hammond, 1962). Hough (1959) described the finding in three cases. In two of these there was an associated fracture of the postero-superior meatal wall. A similar deformity was noted in four of the cases now reported and also in the case reported by the author in 1962.

As would be expected, if the conductive mechanism of the middle ear can be reconstituted, an improvement in hearing can be expected post-operatively.

The following five case reports illustrate a variety of lesions that may be encountered in post-traumatic conductive deafness.

Case Reports

Case I

C.B., a woman of 26, received a head injury in a road accident in April, 1962. She was unconscious for 5 weeks following the accident. It was noted that there was bleeding from the left ear following the injury. When seen in July, 1962, she was complaining of left deafness which she had first noticed on regaining consciousness. On examination the left tympanic membrane was intact. There was an irregularity of the postero-superior meatal wall. There was a conductive deafness present on the left side with normal hearing on the right (Fig. 1).

At tympanotomy, the meatal irregularity was found to be due to a fracture

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of the meatal wall. The incus had been dislocated and rotated (Fig. 2). The incus was removed and a short length of polythene tubing was placed over the head of the stapes; the tympanic membrane then being replaced to be in contact with the tube.

A considerable improvement in hearing was obtained post-operatively (Fig. 1).

![Audiogram](image)

**Fig. 1.**

Audiograms in Case I.

1. Pre-operative.
2. Pre- and post-operative air conduction recording for left ear. The cross hatching indicates the hearing gain.

**Case II**

B.B., a man of 22, received a head injury when he fell from a motorcycle in May, 1963. He was unconscious for several hours. There was bleeding from the left ear at the time of injury and he had a left facial palsy which recovered.
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Case I.

1. Deformity of meatal wall.
2. Dislocation of incus.
3. Polythene tube placed between the stapes and the tympanic membrane.

completely in 6 days. On regaining consciousness he noticed that he was deaf on the left side.

On examining the left ear, there was a smooth bony swelling visible in the posterior attic region. The tympanic membrane was intact. He had a conductive deafness on the left side and normal hearing on the right (Fig. 3).

At tympanotomy a dislocation of the incudo-stapedial joint was discovered. The incus could not be made to re-articulate with the stapes and so a short length of polythene tubing was inserted between the long process of the incus and the head of the stapes (Fig. 4).

There was an improvement in the hearing on the left side post-operatively.
Fig. 3.
Audiograms in Case II.
1. Pre-operative.
2. Post-operative hearing gain.
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Case II

1. Deformity of meatal wall.
2. Dislocation of incudo-stapedial joint.
3 and 4. Polythene tube placed between the stapes and the long process of the incus.

Case III

W.H., a man of 51, fell from a bus and sustained a head injury in 1961. He was unconscious for 4 hours. He subsequently complained that although he had been deaf for about 20 years, his right ear had become much deafer following the accident. The right had previously been his better ear. Both tympanic membranes were normal in appearance but he had a bilateral conductive deafness, worse on the right side (Fig. 5).

At tympanotomy it was found that the stapedial crura had been fractured and the incudo-stapedial joint disrupted. The crura were lying on the promontory. There was a focus of otosclerosis present at the anterior margin of the oval window with fixation of the footplate (Fig. 6).
The footplate was removed and the oval window covered with a vein graft. The crura were then replaced between the incus and the vein graft. There was marked improvement in hearing post-operatively, consistent with a successful stapedectomy operation (Fig. 5).

Case IV

M.S., a girl of 14, sustained a head injury in a car accident in 1959. She was unconscious for 12 hours and had bleeding from the left ear. Two days after the injury, she developed a left facial palsy which persisted for a week. On recovering consciousness she had a severe bilateral deafness which gradually improved for
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6 months but then remained stationary. When seen in 1962 she had a perceptive deafness on the right and a mixed deafness on the left (Fig. 7). The right tympanic membrane was normal in appearance. The left was scarred and there was a deformity of the outer attic wall.

The left middle ear was explored in August, 1962. There was a fracture of the outer attic wall with displacement of a bone fragment downwards and medially. The displaced bone was removed. The malleus had been dislocated and was lying on the promontory embedded in fibrous adhesions (Fig. 8). The incus and stapes were in their normal positions and mobile.

The malleus was removed and the tympanomeatal flap replaced, pressing the tympanic membrane down into contact with the long process of the incus. Postoperatively there was complete closure of the air-bone gap on the left side (Fig. 7).

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Fig. 6.
Case III. Fracture and displacement of stapedial crura.
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FIG. 7.
Audiograms in Case IV.
1. Pre-operative.
2. Post-operative hearing gain.
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FIG. 8.
Case IV. Dislocation of malleus.
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Fig. 9.
Audiograms in Case V.
1. Pre-operative.
2. No significant change in the left air conduction post-operatively.
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Case V.

G.T., a girl of 18, received a head injury in a car accident in 1958. She was unconscious for 3 hours. She developed a left facial palsy which took 6 weeks to recover completely. When seen in April, 1959, she was complaining of left deafness and tinnitus present since the time of the accident. The left tympanic membrane was intact but there was a deformity of the bony meatus posterosuperiorly. There was a left conductive deafness present. The hearing on the right was normal (Fig. 9).

At operation a fracture of the postero-superior margin of the bony meatus was found. There was a displaced bone fragment which was removed. The incus had been dislocated from both the malleus and the stapes (Fig. 10). The incus
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was freed from the surrounding adhesions and re-articulated. It was found that
the malleus was not normally mobile but the tympanomeatal flap was pushed
down to make contact with the long process of the incus.

There was no significant improvement in hearing post-operatively, although
the patient thought that her hearing had improved (Fig. 9).

REFERENCES