



Strasbourg, 30 January 2004

CPT (2004) 12

**EUROPEAN COMMITTEE FOR THE PREVENTION
OF TORTURE AND INHUMAN OR DEGRADING
TREATMENT OR PUNISHMENT**

(CPT)

EAR INJURIES

**Document prepared
by Mr Florin Alexandru STANESCU**

General. The ear (*auricula* in Latin) is the organ used for hearing. The pinnae, because of their location on either side of the head, stick out and, like any such protruberances (e.g. nasal pyramid, knees, elbows, shoulder blades), are exposed to injuries of all kinds.

In Roman times, when a dispute arose that could not be settled amicably, the injured party cited the name of the person thought to be responsible before the Praetor; if the offender did not appear within the specified time limit, the complainant summoned witnesses to make statements. If they refused, as often happened, the injured party was allowed to drag them by the ear and to pinch them hard if they resisted. Hence the French expression "*se faire tirer l'oreille*", of which the literal meaning is "to have one's ear pulled" and the figurative meaning "to take a lot of persuading".

We use the expression "to tweak (or pull) someone's ears" to mean "inflict a punishment".

In the CPT's work, the observation of ear injuries and their consequences (a possible disability resulting from hearing loss) may be proof of ill-treatment.

Brief anatomical and physiological summary. The auditory system in human beings and mammals is in three parts (see diagram in **Fig. 1**):

I. *The outer ear (I)*, with the pinna and the auditory canal (**1**), which is closed at the inner end by the tympanic membrane or eardrum (**2**).

The *pinna* consists of a protruberance, which may be more or less developed, most of which stands free, attached around the auditory canal. There is a semi-circular rim called the *helix* (see **Fig. A**), which begins in the centre of the concha, above the auditory canal, and ends after a semi-circular trajectory below the auditory canal. The lower part, called the *lobule*, is rounded, soft and non-cartilaginous (see **Fig. A**). In women (and sometimes, in recent years, in men), the lobule is pierced so that earrings can be worn.

The pinna serves to capture sound vibrations in the surrounding air and transmit them via the external auditory canal to the eardrum.

The eardrum (**2**) separates the outer ear from the middle ear. It is a membrane which forms a thin, fibrous, relatively transparent barrier, covered on the outside (towards the external auditory canal) by an extension of the skin and on the inside by a mucous membrane. It is roughly circular in shape, concave on the outside and convex on the inside. The eardrum is thicker round the edge, where the final bony part of the external auditory canal is attached to a small bony rim. The membrane is vascularised and innervated.

The eardrum (**2**) serves to convert the sound vibrations in the air into mechanical vibrations and transmit them to the ossicles in the middle ear.

II. *The middle ear (II)* is formed of the tympanic cavity, the lower part of which communicates with the pharynx via the Eustachian tube (**3**). In this cavity there is a chain of small bones or ossicles (**4, 5**), whose names are vaguely reminiscent of their shape: hammer, anvil, lenticular process of incus and stirrup).

The role of the ossicles is to transmit the vibrations received from the eardrum to the oval window, in order to make the liquids in the inner ear vibrate.

The role of the Eustachian tube is to maintain the same air pressure on both sides of the eardrum.

III. *The inner ear (III)*, also known as the bony labyrinth, is inside the portion of the temporal bone known as the petrous bone. It comprises the vestibule, the semi-circular canals and the cochlea.

The inner ear serves to transform sound vibrations into nerve impulses and transmit them to the brain. The inner ear also has an important role in maintaining balance in the human body.

Injuries to the pinna: these are almost always the result of local injury caused by direct blows: slaps, punches or forcing the head against a hard surface, such as a wall or furniture.

The lesions, which may be separate or grouped, may cover the whole surface of both sides of the pinna, if there have been one or more very sharp blows, or, as is usually the case, only the area of the helix (see **Fig. C**). If there have been several hard blows, there may also be lesions (bruising) in the retro-auricular region, on the skin covering the mastoid area.

The lesions take the form of bruises. Their evolution (which is of interest for the purposes of assessing *the date of the injury*) is the result of changes in the blood caused by the rupture of small capillaries in and under the skin at the moment of impact:

- During the first few hours, they are red, the colour coming from oxygenated haemoglobin and from histaminic irritative vasodilation.
- then the haemoglobin loses oxygen and the bruises become blue/purple/brown. This colour persists for two to three days.
- the haemoglobin divides into its components: globin and haematin. The haematin loses iron from its chemical composition and is transformed into bilirubin. The latter gives the bruise a brown colour from the third to the seventh day after the injury. This colour is also due to the oxidation of the iron in the haemoglobin and the production of haemosiderin (the metabolic process begins three to four days after the injury occurs).
- the oxidation of the bilirubin, a process that begins at the outer edges of the bruised area, is caused by biliverdin, which gives a greenish tinge to the edge of the bruise, while the centre remains yellow. This yellowish colour is also maintained by the oxidation of the bivalent iron in the haematin, which, as a result of the haemosiderin, accentuates the yellow colour of the bruise, which may still be visible 10 to 12 days after the injury.

There may be cases in which, as a result of violent injury, the bruise is blueish purple from the outset or even protruding and fluctuating. This signifies a *haematoma* of the pinna (see **Fig. D**), which may necessitate surgical evacuation (after which a scar may be visible).

Without a surgical operation, the haematoma may evolve and there may be a *deformity* as a result of its healing spontaneously or of suppuration and necrosis of the cartilage, leading to a curled-up, bumpy pinna (which can be partially treated by plastic surgery).

If the victim has been "punished" by having his or her ears pulled (which is quite common when schoolchildren or children generally are ill-treated but may also happen to adults, as in the case of ill-treatment during interrogation), there may be half-moon-shaped linear scratches (excoriations) on the bruises, measuring 0.8 to 1 cm each, which are a sign of contact with the assailant's nails (see **Fig. E**).

In prisons and in psychiatric hospitals one can find people with part of their pinna missing as a result of a human bite. After such an "accident" it is preferable to suture the stump surgically. In such cases the scar is concave in shape and marks from the dental arch are often visible (see **Fig. F**). Such cases may be treated by plastic surgery.

Lesions - wounding or bruising - of the lobule of the ear may occur when earrings are pulled out (e.g. in the case of theft or banditry).

One form of serious injury is *fracture of the external auditory canal* that occurs indirectly as a result of a fall on the chin or is caused by a direct blow with a clenched fist on the chin (the anterior part of the auditory canal - the inner, bony part - is crushed by the condyle of the lower jawbone, which is projected backwards as a result of the blow to the chin).

Fracture of the deep, bony part of the external auditory canal and the other parts of the inner ear may also occur in the case of serious injury to the base of the skull, a subject that is beyond the scope of this presentation.

Injuries to the eardrum:

a. *Direct injuries*: caused by the introduction of foreign bodies (especially if pointed) into the external auditory canal, or during incorrect surgical procedures (malpractice).

b. *Indirect injuries*: caused by the application of pressure or reduced pressure to the pinna, which leads to sudden compression or decompression of the column of air in the external auditory canal or the middle ear. This may be the result of barotraumas, detonations, explosions (gunfire) or, more generally, a very loud noise close by or diving into water; people working in hyperbaric chambers and aviators flying at high altitudes are exposed to such injuries. Unusual causes include violent sneezing, a kiss with suction applied to the pinna, etc, but also a hard slap with an open palm on the pinna or a punch (the latter two are of special interest in the CPT's work).

Initially, victims may experience sudden, violent pain deep in the ear (usually in the left ear, as the assailants strike with their right hand). Liquid or congealed blood are found in the external auditory canal. Victims may experience total or partial loss of hearing in the injured ear.

The pressure that causes the eardrum to rupture may affect the inner ear, causing peripheral labyrinth vertigo, and sometimes brief incidents of lipothymia.

The Valsalva manoeuvre (**Fig. 2**) provides proof of this: the person being examined closes his or her mouth and blocks his or her nostrils and exhales forcibly. In this situation, the pressure of the air in the pharynx causes it to penetrate the Eustachian tube in the tympanic cavity, and the subject feels a sudden *popping of the eardrum, which proves that the eardrum is intact and the Eustachian tube permeable.*

Large perforations of the eardrum lead to permanent perforations. If the eardrum injury is recent (a few days old), the Valsalva manoeuvre may cause pain in the injured ear. If the injury is an old one (in simple cases without complications, a ruptured eardrum heals in two to three weeks), the assistant may hear a slight hiss from the injured ear during the manoeuvre, or even feel a stream of air coming out of the ear (provided the Eustachian tube is permeable). It is necessary to be aware of the fact that victims of ill-treatment tend to describe the pop they hear in their ear with satisfaction in the belief that this is proof of injury (this is incorrect: popping during the Valsalva manoeuvre is *proof that the Eustachian tube is permeable and that the eardrum is intact*).

As far as the CPT's practical work is concerned, the conversation during visits could proceed as follows:

- in the event of an allegation that blows were received during an interrogation that was carried out "roughly", one can ask whether the person felt sudden pain in part of his or her body (in which case he or she may refer to the ear);
- one can ask whether he or she can take a few steps, or walk properly (in which case one may be told that the person concerned suffers from, or has suffered from, dizziness);
- one can also ask whether the person suffers from (or has suffered from) short periods of loss of consciousness - lipothymia (in which case, one can ascertain when this began);
- if the subject claims to have received relatively recent injuries (dating from a few days to two or three weeks), one can ask permission to examine his or her ears;
- when inspecting the pinna one should also look at the furrow under the helix, where traces of bruising may persist (see Fig. A);
- if the victim claims that he or she had his ears "pulled", bruising and half-moon-shaped scratches may be found (see Fig. E);
- if there is a recent injury to the eardrum, blood may be seen in the external auditory canal;
- bruising (of varying colours) may be seen on both sides of the pinna, or there may be a haematoma (sensitive, bruised swollen area) on the pinna (see Fig. D);

- if there are old injuries, there may be induration (as a result of a haematoma which has been transformed into a firm cyst) or a deformity of the pinna;
- one could instruct the subject to carry out the Valsalva manoeuvre and see what the results are;
- the information obtained may be compared with the dates, notes and entries in the medical file;
- **WARNING:** a perforated eardrum is not necessarily caused by injury - it may be the result of inflammation and suppuration of the middle ear that occurred some time previously; to rule out this possibility, it is worth asking the subject whether he or she - as quite often happens - had a "runny" ear as a child.

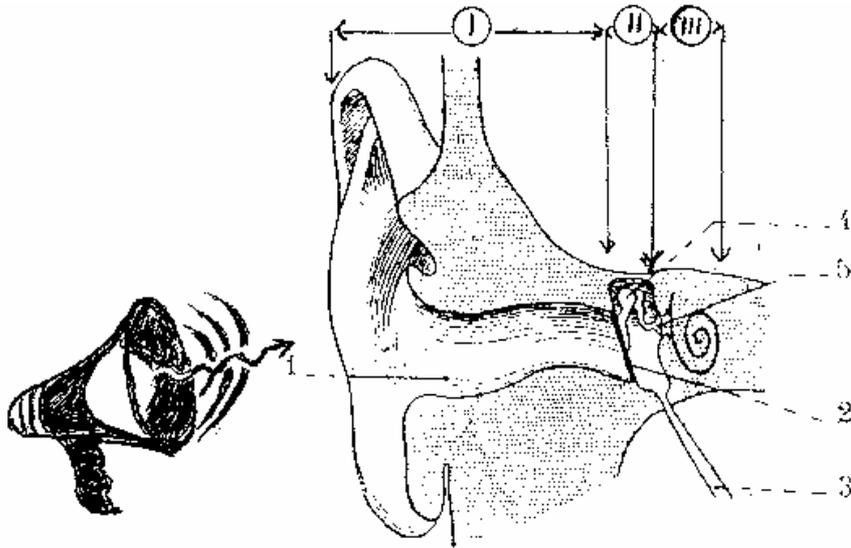


Fig. 1. — Anatomie de l'oreille.

1. Conduit auditif externe. — 2. Tympan. — 3. Trompe d'Eustache. — 4. Marteau. — 5. Enclume.

Fig. 1 - Anatomy of the ear

1. External auditory canal - 2. Eardrum - 3. Eustachian tube - 4. Hammer - 5. Anvil



Fig. 2. — Le Valsalva.

Le « Valsalva » se réalise de la façon suivante : fermant la bouche et obturant bien les narines avec les deux doigts, le malade fait un violent effort d'expiration comme s'il se voulait moucher. Sous l'influence de cette pression, l'air comprimé dans l'arrière-nez pénètre à travers la trompe dans l'oreille moyenne et le malade entend un claquement brusque, le claquement tympanique.

Fig. 2 – The Valsalva manoeuvre

The Valsalva manoeuvre is carried out as follows: with his or her mouth closed and nostrils blocked completely with two fingers, the patient makes a violent effort to exhale, as though he or she wanted to blow his or her nose. Under the effect of the resulting pressure, the air compressed at the back of the nose penetrates the middle ear via the Eustachian tube, and the patient hears a sudden popping of the eardrum.

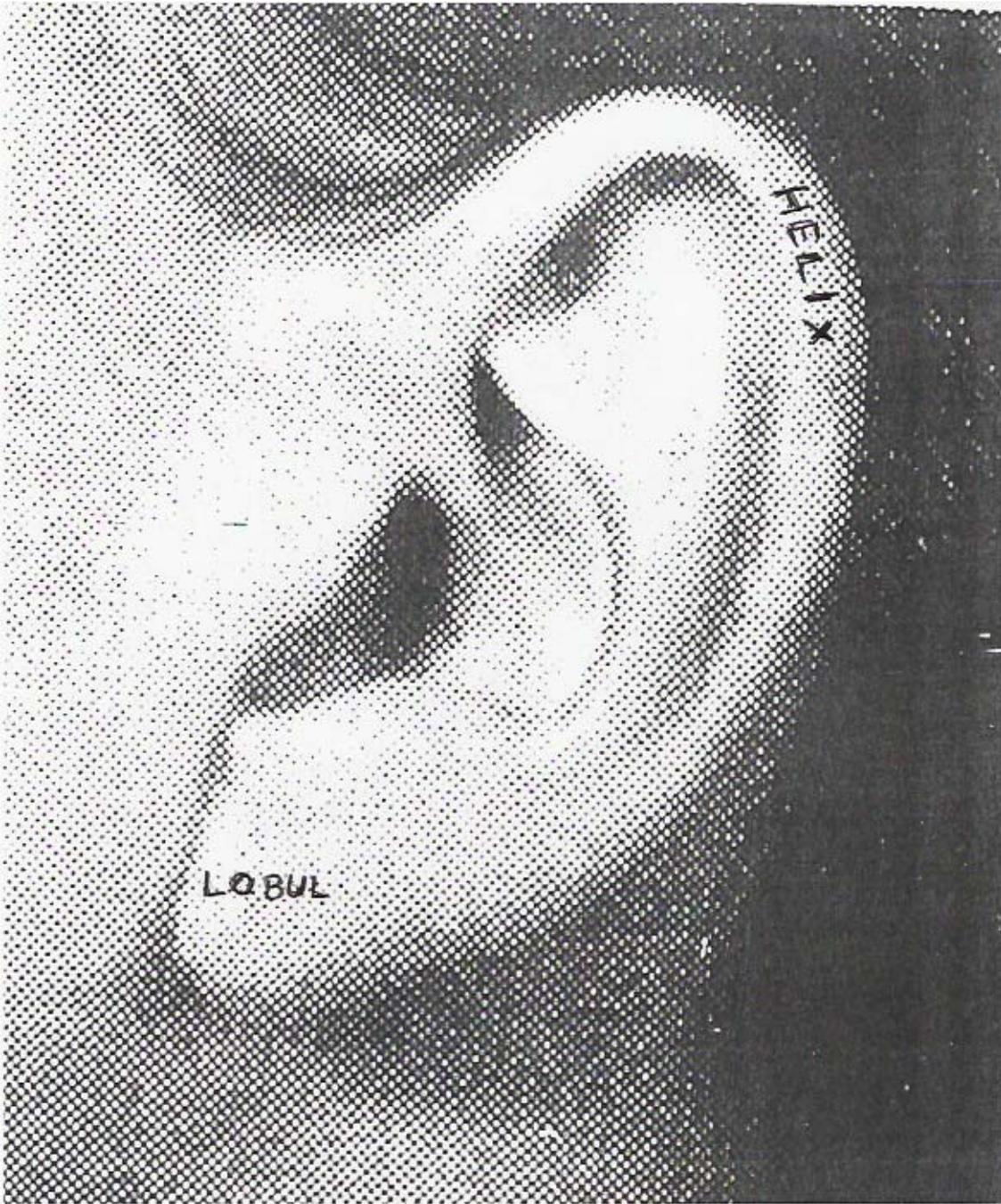


Fig.A

