ON THE "GROWING SKULL FRACTURES" IN CHILDREN WITH A CONTRIBUTION OF TWO CASES

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"Growing skull fractures" in children (GSFC) represent difficult diagnostic, surgical, therapeutic, and expert problems. The two case reports indicate the great rarity of this syndrome (0.08 per cent of the author's clinical contingent). They are characterized by five common signs: direct head injury with a complicated course; presence of local swelling and deformity of the head; craniographically visible calvarial defect of a funnel-shaped structure; growing of the defect with swelling at its site appearing like a "traumatic pseudomeningocele", and xanthochromic content of the swelling's puncture. These observations are author's own contributions to GSFC casuistics. Small infant's age is a predisposing factor for GSFC. The author considers the detachment of the periost and appearance of subperiostal liquoroma or "hydrohaematoma" as a possible pathogenetic mechanism. Therefore, GSFC represents a syndrome of complication in evolution stage.

Key-words: Growing skull fracture in childhood, etiopathogenesis, diagnosis, neurosurgery, case reports

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"Growing skull fractures" in children (GSFC) represent difficult diagnostic, surgical, therapeutic, and expert problems. The author allows himself to report the following two clinical cases because of the rare occurrence of this syndrome.

CASE ONE

A 5-year-old girl (H.H.H., Record No 34236/1973), pre-term born with hydrocephaly that had occurred after the first month of life and advanced shockwise. At the age of one year and 2 months he has fallen down from a cradle and struck on the left frontal head region. Immediately after that an intumescence of increasing volume at the site of injury appeared. A drainage operation after Peter was performed for the communicating hydrocephaly resulting in the stabilization of the hydrocephaly. An epileptic convulsion attack had appeared first at the age of four years. Subsequently, he had not been capable of moving his right extremities any more and his gate was disturbed. The somatic status showed a hydrocephalic head of a circumference of 60 cm. In the left frontal capillitim region a round, small-orange-sized swelling was observed. At palpation the swelling was of bone density at...
its basis and laterally while at the apex it was soft and fluctuating. The neurological status revealed a spasticity of the four extremities which was more outlined in the right side. Bilaterally, there was dysmetry and intention tremor. A spastic-paretic gate along with quadrihyperreflexia was also noted. Babinski’s reflex was bilaterally positive. There was a mental retardation and he looked like a 3-year-old child only. Survey craniographs demonstrated a hydrocephalic skull as in the left frontal region a calvarial defect of 12/10 cm in size and with funnel-shaped prominent vizor-like ends with an osteosclerotic edge was visualized. Tangential craniograph indicated an osseous defect on the peak of the prominence. Ocular fundus examinations detected oedematous papillae as well as visus of +2D.

The swelling was punctured and an erythroxanthomatous cerebrospinal fluid was drained that flowed out under normal pressure. The analysis showed positive globulin reactions and a total protein concentration of 1,5 g/l. Lumbar puncture demonstrated a strongly xanthochromic cerebrospinal fluid flowing out under normal pressure, with positive globulin reactions and a total protein concentration of 1,55 g/l. A positive ventriculography, i.e. iodine ventriculography with Duroliopaque, was performed through the calvarial defect detecting the presence of a true ventriculomegaly (with normal cerebrospinal fluid pressure at the same time). The roentgenoscopic following-up on the next day identified the contast matter in the terminal sac.

CASE TWO

A 2-and-a-half-year-old boy (V.P.S., Record No 23203/1976) presented anamnestically with fourfold head injuries in the right frontal region. Several days after the last trauma a swelling occurred in the right supraorbital area. The swelling was initially hazelnut-sized but later on it grew-up to that of hen’s egg and involved the right upper eyelid. The puncture of the swelling resulted in the drain-age of a xanthochromic fluid. After dressing removal the swelling appeared again at the same site. The somatic status showed a palpable and fluctuating soft swelling of egg-size located in the right supraorbital region and descending down to the eyebrow thus affecting the upper eyelid, too. Palpatorily, the upper orbital edge was discontinued and destroyed. The right ocular bulbus was luxated in an anterior-inferior direction. Craniographically, there was a skull defect in the right supraorbital region with irregular contours and osteosclerotically prominent edges. The upper orbital edge was jagged and partially missing. The dynamic following-up indicated an increase of the defect.

This was the reason for an operative intervention. A wide and comfortable penetration into the right supraorbital space established a subperiostal collection filling the site of the skull defect with a xanthochromic content. The nature of this collection was of a capsulated formation located between the periost and dura mater and compressing the ocular bulbus through the damaged part of the orbital cover. The edge of the osseous defect was vizor-like
rolled out. From this defect, a broad fissure line emerged and descended into a temporal direction. After refreshment of the sclerotic, osseous edge of the defect up to obviously intact bone, the cyst-like collection was evacuated and the capsule was extirpated until the dura mater was revealed. An appropriate bone homotransplantate model was matched according to the thickness, size, and shape of the defect. It was properly situated within the defect paying particular attention to the orbital edge and then fixed at three sites by orthopaedic wire. Later on it was covered by periost. Postoperative following-up demonstrated a good adaptation and fixation of the homotransplantate. Catamnestically, a complete restoration was reported.

DISCUSSION

These two case reports are selected among a total of 2489 author’s own observations of craniocerebral injuries in children. It is obvious that GSFCs represent a great rarity, indeed. Reducing to a common clinical denominator these case reports necessitates the emphasis on the following five common signs:

1. direct head injury with a complicated course;
2. presence of local swelling and deformity of the head;
3. craniographically visible calvarial defect of a peculiar funnel-shaped structure and with a osteosclerotic edge at its basis;
4. growing and enlargement of the defect along with swelling growth appearing like a “traumatic pseudomeningocele” as indicated by control following-up, and
5. xanthochromic content of the swelling’s puncture.

There are four scientific communications in the Bulgarian literature available dealing with GSFC (2-5). The unifying sign of these case reports is an increasing skull defect in the territory of a plane bone with outer prominence of its margins. In our two cases there are lesions of the epicranium and the small age of the traumatized patients is a predisposing factor. Our modest experience enables us to agree with other authors’ opinion (3) that GSFCs are not of theoretical interest only. Besides the growing defect a series of cosmetic troubles occur. The denomination of “growing skull fracture” belongs to Pia and to Tonnis and Pia (cited after 2). An incidence rate of 0.05 per cent has been reported (6). In our opinion, a possible pathogenetic mechanism may consist in the traumatization and detachment of the periost with bone fracture and appearance of subperiostal liquoroma or “hydrohaematoma”. The variety of clinical manifestations is determined by the degree and localization of the cerebral damage. The operative treatment is a matter of choice and opportunities. One aims at correcting the defects of both dura mater and skull as well as at evacuating the existing cysts. Taking into consideration the small patient’s age, autotransplantations are preferred as a plastic material (2). The conservative treatment can be applied either as supplementation, or independently.
A resorption of osseous tissue after head injury in early childhood has been described where the bone defect has thinned margins (1). Stein and Tenner (7) reported cases with “enlarging” skull fractures in children and explained them with laceration of both dura mater and arachnoidea underlying the fracture. According to other authors, until 1968 a total of 50 cases with GSFC were reported in the literature (8). At the time of injury, sucklings aged up to one year represented one half of the cases but 90 per cent of the infants were aged up to 3 years only. We tend to accept that the traumatic detachment of the periost and fissure alone could disturb the trophies of the bone and thus cause GSFC. The operative intervention comes to the forefront in case of failed conservative treatment.

In conclusion, we prefer the denomination “growing fracture” as more appropriate in childhood (4,5).

REFERENCES


Върху "нарастващите фрактури на черепа" при деца с принос на два случая

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Резюме: "Нарастващите фрактури на черепа" (НФЧД) представляват трудни диагностични хирургични, лечебни и експертни проблеми. Представените два случая показват голяма рядкост на този синдром - 0,08 %, характеризираща се с пет общи белеза: директна травма на главата, краниографски визуализиран дефект на калварията с фуниевиден строеж, нарастване на дефекта с подутина на неговото място и вид на "травмено менингоцеле", а пунктатът на подутина показва ксантохромно съдържимо. Двата случая представляват наш принос в казуистиката на НФЧД. Ние възприемаме патогенетичния механизъм при отлепването на периоста и поява на субperiостален ликвором или "хидрохематом". НФЧД представлява синдром на усложнение в еволюция.