Fetal antenatal surgery - a new paradigma in medico-legal evaluation of the new-born viability. Case presentation

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Abstract: The presentation of a congenital diaphragmatic hernia (CDH) case offered the authors the occasion to bring into discussion problems dealt to the foetus fundamental rights, to the contemporary potentialities of the fetal antenatal surgery – surgery, to the medico-legal evaluation of the foetus viability and last but not least, to the feeding channel ontogenesis.

Key words: congenital diaphragmatic, hernia, fetal surgery, viability, ontogenesis.

The existence of a congenital malformation in an alive born foetus / living-born foetus stands for an important factor in evaluation his/her viability [1]. By presenting a congenital diaphragmatic hernia (CDH) [2,3] we would focus on three fundamental matters of a topical interest such as:

- the existing therapeutic potentialities for an antepartum surgical re-make of a diaphragm;
- temporo-spacial involvement of that therapeutic approach in medico-legal evaluation of the foetus viability;
- anatomical consequences of the small and large intestines migration from the abdominal cavity to the thoracal cage on the mesoes topography.

Anatomoclinical presentation of the case

a. Clinical semeiologic data and clinical diagnosis

It’s about a new-born, male, after a 37 weeks pregnancy; mother aged of 21 is I pregnancy and I parturition. Antenatal diagnosis: intrauterine hypoxia; hepatosplenomegalia; meningocerebral hemorrhage. Postpartum diagnosis: partial cyanosis, prolonged apnea, atony, areflexia, APGAR 3 to 1. Clinical semeiologic data: serious general health state, generalized cyanosis, dyspnea, absent vesicular murmur; AV=40/min; liver at 4-5 cm under the costal angle; absent Moro reflex.

b. Anatomical semeiology and anthropometry date

Anthropometry: weight = 3000 g; length = 51 cm; skull perimeter = 34 cm; thoracal perimeter = 34 cm. After opening the trunk cavities by mentum – suprapubial incision, we easily visualized the presence of the ileum and jejunal intestinal ansal in 2/3 of the thoracal cage space.
Fig. 1. Placing and relationships of the small and large intestines in CDH. 1. Small intestine; 2. Atrophic left lung; 3. Heart; 4. Folded transverse large intestine; 5. Thoracoabdominal diaphragma covered by large intestine at the limit between the transverse intestine and the descending large intestine; 6. Transverse mesocolon; 7. Mesenterium; 8. Terminal ileon; 9. Cecum and appendix; 10. Descending mesocolon.
Dextrocardia, as an effect of the intestinal intrathoracal ansae presence. Left lung atrophy (Fig. 1). Right lung normal conformed and compressed into the lateral 1/3 left hemithorax (Fig. 1A).

Analyzing the tract of the intestinal ansae allowed us to identify the jejunal ansae making up sinusoidal-shaped curls having an oblique tract, up to down descendent and form left to right. Ileal ansae, on the other hand, with tract on a horizontal plane (Fig. 1A).

Traverse large intestine full of mecomium is present into the posterior part of the left hemithorax and it becomes visible after the antero-inferior, left-lateral overturning of the intestinal ansal (Fig. 1B). It continues with the descendent large intestine after running the left-anterior part of the thoracal diaphragma (Fig. 1C and 1D). Terminal ileo and ceccal – appendicular area were visualized by overturning andtracting the descendent large intestine towards laterally.

We observed a small intestine meso (Mesenterium) continuity to the large intestine portions mesoes (Mesocolon: ascendens, transversum and descendens). (Fig. 1 E and 1F).

Discussions

The presented case determined us to ask many questions:
1. Could CDH be antenatal diagnosed?;
2. Is it incompatible disease to life ?;
3. Could it be surgically treated antenatale and which is the best moment for an antenatal surgery of the foetus ?
4. Which are the surgery risks for the for the mother or foetus ?;
5. Why the foetus antenatale surgery centres are not extended?;
6. Could the location of the transdiaphragmatically herniated visceral from the abdomen to the thoracal cage offer information for the long-discussed understanding of the digestive tube development ?;
7. Which are the thanatogenerator factors in the CDH case?;
8. Which are the particularities of the foetus necropsy generally? But in CDH especially?

a. Problems dealt to the fetal antenatal surgery

The fetal antenatal surgery on an “open uterus” appeared and developed as a necessity imposed by some congenital malformations therapy, otherwise reducing the surviving chances [4]. The first fetal antenatal surgery on an “open uterus” was registered in 1981 at the University of California (San Francisco) and it was performed by a team led by Michael Harrison [5,6,7,8,9,10].

Progresses registered in the prenatal diagnosis with ultrasounds opened the way to that surgery with multidisciplinary approach by involving pediatrician surgeon, obstetrician, sonographist, neonatologist, genetician and medical ethicist [11].

Fetal antenatal surgery needs the pregnant uterus were opened foetoscopic tracheal occlusion, the surgical correction of the malformation, foetus re-introduction into the uterus and finally the uterus and abdomen walls closing [5,6].
b. Problems dealt to the feeding channel ontogenesis

The case presented brings new reasons by the anatomic effects of the small and large intestines migration from the abdominal cavity to the thoracal cage, for the mesoes special topography understanding [12]. From our observations analysis it resulted that, through the mesenterium was placed intrathoracally, it hold its origin into the duodenal curvature and its end into the ceccoappendicular area. We observed a structural continuity between the small and parts of the large intestine mesoes. As to understand the changes existing in our case, a feeding channel ontogenesis rememorizing is necessary.

Initially, there is an epithelial tube curled up for many times, surrounded by splanchnopleura and attached to both the dorsal and ventral walls of the trunk by re-folds called “mesoes” [13]. Inside the mesoes, there are blood vessels designated for the feeding channel subdiaphragmatically: the branches of the celiac trunk for the gastric floor, the superior mesenteric artery for jejunum, ileon and right large intestine and the inferior mesenteric artery for the terminal intestine [14,15].

A discussion on the controversies concerning the umbilical intestinal ansa evolution and the mesoes is necessary. The concept of their evolution by successive turns can be find throughout the anatomic literature [6,9, 14,15,16,17,18,19,20]. However, those authors admit that the jejunal – ileal ansae mesoes were continuous to the ascending large intestine meso form the beginning of their evolution.

When the ascending mesocolon joins the posterior wall of the abdomen, the jejunal-ileal meso would get a new insertion line which would unite the duodoeno-jejunal angle to the ileoceccal junction Frédet [21,22].

Relationships between the middle intestine derivatives, their mesoes and the dorsal abdominal wall were evaluated in a different way within the history of knowledge. Frédet described turning movements of the umbilical ansa. It’s therefore to be noted that the situation becomes complicated because simultaneously the intestine keeps on developing and becomes folded and thus, the effects of the successive turning would be unclear.

Pernkopf, 1920, was the first who noted the absence of logic for a certain part of Frédet’s by pothesis. After the 180º turning the large intestine is found cranially and the small intestine-caudally. The common meso root would be found inside the duodenal curvature so that the mesocolonum is situated upside and the small intestine meso downside and, it also exists continuity at the right; therefore, the curve described by the common mesenterium root is parallel inside the duodenal ansa, too. That situation is impossible to be explained by Frédet’s mechanism.

Repciuc and Meffert [23] demonstrated that the reality is different from that Frédet imagined namely, the umbilical ansa meso, which is cone-shaped sectioned after the generating line and it is opened on the right side, joins to the duodenum meso.

It is initially about horizontally and it forms an ensemble which Pernkopf called “common mesenteric pedicle” (lat. truncus mesenteries communis). Mesocolonum remains very short while mesenterium remarkably peritoneal cavity (physiological hernia). As a consequence of that phenomenon, the large intestine remains above the small intestine ansae. That phenomenon was found in our case, too (Fig. 1E). In the last stage of development, the small intestine joins the posterior wall of the abdomen at the same time with the
mesoduodenum resulting in the coalescence fasciae: Treitz (retroduodenal) and Told (behind the joined mesenterium).

By analyzing our case, one can easily observe the absence of the Told coalescence process, which allowed intestines to migrate into the thoracal cage. Following the forming of the Treitz coalescence fascia, the duodenum appears fixed on the posterior wall of the abdomen and the mesenterium holds its origin into the duodenum curvature (Fig. 1E).

**Conclusions**

1. The foetus examined by us was born alive but unviable by the presence of a congenital diaphragmatic hernia (CDH) antenatally unoperated.
2. CDH is not a malformation incompatible to surviving as the antenatal surgery develops continuously.
3. Under the circumstances of the existence of certain strong centres of fetal surgical therapy, by the neglecting of that malformation, the family physician could be responsible for the consequences.
4. A new epoch is opened within the medical ethics and deontology being imposed by the **fundamental foetus rights** winning more and more area in the civil code [24].

**References**


