The neonatal period of twins treated with selective laser photocoagulation – case report

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Abstract

Twin-to-twin transfusion syndrome (TTTS) is one of the most dangerous obstetrical complications connected with multiple pregnancies. It appears in 15% of monochorionic twin gestations. Since May 2006 till May 2007 in the Department of Neonatology Warsaw Medical University 6 newborns born from four twin monochorionic pregnancies, complicated with twin-to-twin transfusion syndrome were hospitalized. All gestations were treated with the selective laser photoagulation of communicating vessels before 22 weeks of gestation in the Department of Obstetrics, Medical University of Gdańsk.

Key words: twin-to-twin transfusion syndrome, selective laser photocoagulation, newborn

Introduction

Twin-to-twin transfusion syndrome (TTTS) is one of the most dangerous obstetrical complications connected with multiple pregnancies. It appears in 15% of monochorionic twin gestations.

TTTS results from an unequal and pathological blood flow through the abnormal placenta blood vessels joining cardiovascular systems of two fetuses. With monochorionic twins, the placenta blood vessels connections are very frequent, accounting for 98% of cases. There may be either deep (arteriovenous) or superficial (arterioarterial or venovenous) anastomoses. In most cases, between the circulatory systems of both twins there appear arteriovenous anastomoses, which may lead to TTTS. Without an appropriate treatment, prognoses are bad and prenatal mortality reaches 80% [1-3].

One of the twins, called “donor”, becomes more and more anaemic, which results with its restrained growth; oliguria and subsequent oligohydramnios or anhydramnios can be observed.

The “recipient”, in his turn, suffers from growing oedema causing polyuria, hydramnios and cardio-vascular disorders such as cardiomegaly. The consequence of those abnormalities is the general fetal oedema. Preterm delivery in those cases is inevitable due to the fact that growing hydramnios may lead to intrauterine death of both fetuses [4].

In the past the prenatal diagnosis of twin-to-twin transfusion syndrome was based mainly on sonographic evaluation of unequal distribution of amniotic fluid in both amniotic sacs as well as on growth discrepancy between two fetuses. In many cases the donor twin, being smaller and lacking amniotic fluid, was placed in a corner of the uterine cavity, which caused difficulties with its evaluation.

Abnormal flows, detected with Doppler method, were frequent and the growth of “recipient” fetus oedema gave evidence of terminally advanced level of the pathology. If one fetus died, the rapid changes in circulatory haemodynamics caused death or irreversible damage to CNS of the second twin. The traditional method consisted in serial amnioreduction, accounted for over 50%, whereas the fetuses who survived in 40% of cases suffered from more or less important neurological disorders. The method of laser photoagulation of abnormal placenta blood vessels connections resulted in significant decrease of fatality and mortality rates. However, this technically complicated procedure is available only in a number of chosen hospitals, but enables to give birth to fully sound, well-developing newborns [4-6].

Description of four clinical cases (tab. 1)

Since May 2006 till May 2007 in the Department of Neonatology Warsaw Medical University there were born 6 newborns from four twin monochorionic pregnancies, suffering from twin-to-twin transfusion syndrome. All fetuses were treated with the selective laser photoagulation before the 21st week of gestation in the Department of Obstetrics, Medical University of Gdańsk.

M-s- male twin newborn born spontaneously at 32 weeks of gestation weighing 1690 g. The child’s overall condition good (10 pts in Apgar score). The pregnancy history revealed that the second twin died in the 21 week of gestation. TTTS was diagnosed. The newborn was treated with empirical antibiotic therapy (Amoxicilin and Netilmicine) due to a possibility of intrauterine infection.

Due to increasing respiratory efforts, the child was given ventilatory support using nCPAP (4 days). The chest X-rays revealed an adaptation changes. In 29th day of life, because of
anemia, the child had RBC transfused without complications. The infectious work-up remained good. In cranial ultrasound scan, possible partial agenesis of the callous body was detected. Cerebral ventricular system slightly enlarged, mainly at the left side. External fluid spaces enlarged. In cardiac ECHO a slight PDA shunt was diagnosed. Discharged from hospital in 33 day of life in a good general condition and the body weight of 2240 g.

The child was consulted in the Neonate Follow-up Department, where the increased muscular tension and asymmetric positioning were diagnosed. Cerebral USG scan performed 6 weeks and then 2 consecutive weeks later confirmed previous findings. In cardiac ECHO PFO without PDA was diagnosed. The child remained under neurological control and was subject to motor stimulation. The parents didn’t respond to our request of monitoring the later development of the child.

Newborn B-c-, female twin I, born in 37 week of gestation by caesarean section (due to the breach position of the I fetus and transverse position of the II one). Clear amniotic fluid was evacuated during the caesarean section. The child was born in moderately impaired condition: in 1st minute it was given 4 pts, in the 5th – 7 pts in Apgar score. Body weight 1160 g. Intubated in the 2nd minute of life. Admitted to Neonates Intensive Care Newborn where mechanical ventilation was started. Increasing infectious parameters were observed in the mother. In the 2nd hour of life the child was given surfactant and antibiotic therapy was administered. Rapid multiorgan failure was observed, the patient was treated with 3 kinds of catecholamine. In additional examinations, symptoms of an infection were diagnosed, cardiac ECHO revealed hypertension in pulmonary circulation and clinical signs and symptoms of septic shock. In bacteriological examination *Pseudomonas aeruginosa* were obtained. Newborn died in the 16th hour after birth.

Newborn W-s-, twin I, male born prematurely in 28th week of twin gestation by caesarean section (for reasons: see above). Clear amniotic fluid got evacuated during the caesarean section. Newborn’s body weight 1180 g. In the 1st minute of life it was given 6 pts in Apgar scale and in the 5th – 7. Intubated in the 3rd minute of life, admitted to Neonates Intensive Care Department. Increasing infectious parameters were observed in the mother. Due to respiratory disorders, the child was given surfactant and its general condition improved. It also received Dopamine because of hypotension. The child was given antibiotic therapy, first empiric and then guided. In bacteriological examination *Pseudomonas aeruginosa* was obtained. In cranial ultrasound scan, II degree haemorrhage was diagnosed on the right and I degree on the left. Neurological disorders were not observed. The child was discharged from hospital in good general condition in 71 day of life (38 week of PCA).

The analysis of the fourth clinical situations gives us some clinical pictures and early follow-up for children from twin monochorionic pregnancies with TTTS treated with a selective laser photoocoagulation before 20th week of gestation. It is not

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**Table 1. Newborn’s characteristics**

<table>
<thead>
<tr>
<th>initials</th>
<th>GA</th>
<th>Birth weight (g)</th>
<th>Apgar 1' ; 5'</th>
<th>Mode of delivery</th>
<th>Time of SLPH-GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>32</td>
<td>1690</td>
<td>10.10</td>
<td>PSN</td>
<td>21</td>
</tr>
<tr>
<td>Bc I</td>
<td>37</td>
<td>2350</td>
<td>8</td>
<td>CC</td>
<td>19</td>
</tr>
<tr>
<td>Bc II</td>
<td>37</td>
<td>1700</td>
<td>10.10</td>
<td>CC</td>
<td>19</td>
</tr>
<tr>
<td>Ws*</td>
<td>27</td>
<td>880</td>
<td>3.4</td>
<td>TD</td>
<td>20</td>
</tr>
<tr>
<td>Ws I#</td>
<td>28</td>
<td>1160</td>
<td>4.7</td>
<td>CC</td>
<td>20</td>
</tr>
<tr>
<td>Ws II</td>
<td>28</td>
<td>1180</td>
<td>6.7</td>
<td>CC</td>
<td>20</td>
</tr>
</tbody>
</table>

*BSPH-GA selective laser photoocoagulation – gestational age*
much, but research has only started and we think that even a small number of patients may give us an idea of problems related to this method of treatment.

Out of the fourth above mentioned twin pregnancy cases, two mothers gave birth only to one child (the second one died in utero in the 20th and 21st week of gestation). Two pregnancies ended with twin delivery. In one of those cases, a postnatal children’s body weight discrepancy of about 20% was observed. One mother gave birth to twins in the 37th week of pregnancy and another one prematurely, in 28th week. Single newborns were delivered: in the 32nd week and in 27th week of gestation. Among newborns could observe following clinical problems.

Respiratory problems

Three children, born prematurely in the 27 and 28 week of gestation, suffered from respiratory difficulties (RDS) of various degrees, which required administration of surfactant. Those abnormalities were probably caused by immaturity of infants born before term. In one of the newborns, delivered in 32 week of gestation, respiratory adaptation disorders could have been diagnosed.

Circulatory problems

One of the children demonstrated a slight PDA shunt, which didn’t need an intervention. During subsequent monitoring, PFO was diagnosed.

PDA was detected in one of the children in the 4th day of life, treated pharmacologically. The treatment did not prove to be efficient, therefore the child was successfully operated on in the 10th day of life. One child had prenatal pulmonary artery stenosis diagnosed and was given Prostin postnatally. In the first day of life the child was sent to the Department of Cardiology in the Children’s Memorial Hospital in Warsaw for further treatment.

Infectious problems

One child died in the first day of life because of multiorgan failure due to intrauterine infection with Pseudomonas aeruginosa. In one case congenital cytomegaly was diagnosed and treated with Gancyclovir. The treatment was continued in the Children’s Memorial Hospital in Warsaw.

All newborns needed antibiotic therapy instituted from the first day of life.

Neurological problems

In one child, cranial sound examination revealed partial agenesis of the corpus callosum. The child was subject to motor stimulation and rehabilitated.

In one case, during ultrasonographic scan of the child with cytomegaly, increased echogenity of periventricular brain tissue and subarachnoidal haemorrhage were diagnosed. Neurological abnormalities such as increased muscular tension were equally observed.

In one of the children, USG scan revealed II degree haemorrhage to CNS on the right and I degree on the left. Neurological disorders were not detected.

Discussion and conclusion

TTTS causes high intrauterine mortality of fetuses. Without an appropriate treatment, it reaches even 100% of cases. Thanks to the serial amniодrainage method of treatment, the mortality may be reduced to 68%. With the selective laser photocoagulation of abnormal placenta blood vessels connections, the risk of death in utero falls even to 50-60%. Unfortunately, this therapy still involves the risk of sudden death of a foetus or even both foetuses, in spite of this procedure [7-10].

Analysing the clinical cases of our patients we can see that out of four cases of TTTS treatment, two foetuses died in utero. Equally frequent is the premature labour after the photocoagulation intervention, which increases the death risk of a premature foetus.

Damage of the central nervous system in the form of haemorrhage or leucomalacia is relatively frequent in the TTTS syndrome, but it might be related to the prematurity of children born before the term. It is thought that a certain number of damages may occur postnatally [4, 7].

Taking into account the described problems it seems that some of them may be related to the twin-to-twin transfusion syndrome occurring in those pregnancies. It is believed that in twin pregnancy newborns treated with the selective laser coagulation may appear congenital structural heart defects, especially pulmonary artery stenosis, which could have been observed in one case. These pregnancies may as well not cause any cardiovascular disorders, which happened in the remaining cases.

Unfortunately, having discharged the children from our hospital, we couldn’t follow up their development. This information would have surely contributed to our knowledge and given answers to many questions. Longer monitoring of the children with TTTS as well as the possibility to compare their development with a control group consisting of newborns and early infants is necessary.

References


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