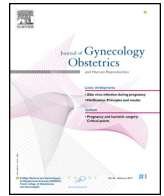




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Original Article

Expectant management and laser photocoagulation in isolated selective intra-uterine growth restriction: A single-center series

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ABSTRACT

Introduction. – The objective was to report on a consecutive series of monochorionic diamniotic pregnancies complicated by selective Intra-Uterine Growth Restriction (sIUGR) and to describe perinatal outcomes based on whether or not there were umbilical Doppler findings, and specifically to study those pregnancies treated by laser.

Material and methods. – This was a retrospective cohort study enrolling monochorionic diamniotic pregnancies presenting isolated sIUGR after 16 weeks' gestation (WG).

Results. – Of the 25 cases of sIUGR, 16 were type I and 9 type II or III. Types II and III occurred earlier than type I (22.3 versus 24.3 WG), were more severe (discordance of 37% versus 23%), and delivered earlier (31.3 versus 33.9 WG). Survival was 12/18 (66.7%) for types II or III versus 32/32 (100%) for type I. Five laser photocoagulation procedures were attempted and allowed the survival of both twins in 2 cases. Overall survival after laser was 6/10 (60%).

Discussion. – Isolated sIUGR is associated with high perinatal morbidity and mortality. Laser photocoagulation treatment is feasible and may enable survival of both twins in some cases, but may be technically difficult.

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Introduction

Monochorionic diamniotic twin pregnancies present specific complications linked to placental architecture and vascular anastomoses: Twin-Twin Transfusion Syndrome (TTTS), Twin Anemia-Polycythemia Sequence (TAPS), and selective Intra-Uterine Growth Restriction (sIUGR). This last entity is thought to occur in 10 to 15% of monochorionic pregnancies [1,2]. It is defined as growth below the 10th percentile in one of the twins, which is usually associated with a more than 25% difference in estimated fetal weights. Several hypotheses have been advanced to account for this intertwin growth discrepancy. The principal cause of growth restriction is the unequally shared placenta, the intertwin weight discrepancy being all the more flagrant when

there is a major difference in placental sharing. Velamentous cord insertion is an indirect marker of unequal placental sharing and is more often found in cases of sIUGR [3]. Lastly, it should be noted that if there is unequal placental sharing it is common to find wider arteriovenous anastomoses and a generally far denser network of feto-fetal anastomoses [4]. These anastomoses are undoubtedly what enable the twin with the smaller placental share to survive.

Selective growth restriction in monochorionic pregnancies leads to varying degrees of morbidity and mortality depending on the severity of sIUGR, the intertwin growth differential and Doppler anomalies [5–8]. Nevertheless, sIUGR remains an entity, which is not widely understood, either in terms of its clinical presentation, or its natural course and complications. Moreover, there is no consensus about appropriate management, whether by attempted laser photocoagulation, selective termination of pregnancy or based on a “wait-and-see” policy [9–12]. Our hypothesis is that laser photocoagulation may enable the survival of both twins.

The objective of this paper was to report on a consecutive series of monochorionic diamniotic pregnancies complicated by sIUGR and to describe perinatal outcomes based on whether or not there

Abbreviations: sIUGR, selective intra-uterine growth restriction; WG, weeks' gestation; TTTS, twin-twin transfusion syndrome; TAPS, twin anemia-polycythemia sequence; IUFD, intra-uterine fetal death; EFW, estimated fetal weight.

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were umbilical Doppler findings, and specifically to study those pregnancies treated by laser.

Material and methods

Study type

This was a retrospective cohort study of monochorionic diamniotic pregnancies presenting sIUGR after 16 weeks' gestation (WG), followed up from January 2008 to December 2015 at the University Hospitals of Strasbourg which consists of the Schiltigheim Medico-Surgical and Obstetric Center (level 2 maternity unit) and the Hôpital de Hautepierre (level 3 maternity unit), the latter being the regional prenatal diagnostic referral center. Exclusion criteria were the finding of TTTS, TAPS, chromosomal and/or constitutional anomalies and Intra-Uterine Fetal Death (IUFD) at the time of diagnosis. The study was registered with the French data protection agency, CNIL, registration number 1940490.

Definitions

Selective IUGR was defined as an Estimated Fetal Weight (EFW) below the 10th percentile for one of the twins based on the standard curves of the French National College of Gynaecologists and Obstetricians (CNGOF) [13,14]. Ultrasound estimation of fetal weight was calculated using Hadlock's formula [15]. Selective IUGR was categorized into 3 types based on umbilical artery Doppler investigation of the fetus presenting sIUGR in line with Gratacòs's classification [13]: type I (normal Doppler), type II (persistent absent or reversed end-diastolic flow) and type III (intermittent absent or reversed end-diastolic flow). The growth discrepancy was calculated using the formula: (EFW of larger fetus - W of fetus with sIUGR)/EFW of larger fetus.

TTTS was defined as the presence of oligohydramnios with a deepest vertical pocket less than 2 cm in the donor, and polyhydramnios with a deepest vertical pocket greater than 8 cm before 20 WG and greater than 10 cm after 20 WG in the recipient [16].

TAPS corresponded to the presence of one anemic twin defined by a cerebral Peak Systolic Velocity (PSV) greater than 1.5 multiples of median (MoM) and the other polycythemic twin defined by a cerebral PSV less than 1 MoM [17,18], occurring spontaneously or following TTTS laser treatment [19].

Early neonatal death was defined by the occurrence of neonatal death within the first seven days of life.

Management

Chorionicity was diagnosed by an absent lambda sign on first trimester echography. Each monochorionic diamniotic pregnancy underwent repeat ultrasound monitoring every two weeks. Echography was performed by a specialized physician skilled in the use of Voluson 730, E8 and E10 devices (General Electric®, USA). Patients were in a slight left lateral decubitus position. Ultrasound investigation routinely included biometric measurements, assessment of the amount of amniotic fluid (measurement of the deepest vertical pocket), and Doppler evaluation of the umbilical, cerebral and aortic arteries. Localization of cord insertions was routinely determined. Pulsed Doppler examination of both umbilical arteries was performed in a free loop of the umbilical cord near placental insertion. The angle of insonation was zero or as near to zero as possible. Lastly, a complete morphological examination was carried out including especially an analysis of the cerebral structures and cardiac hemodynamics.

Laser photocoagulation treatment was offered in cases of sIUGR associated with umbilical Doppler anomalies (type II and III) and if

technical conditions were favorable especially with regard to the placental localization. Cord coagulation of the sIUGR twin was only considered in the event of imminent demise. Patients were counselled by a multidisciplinary team and gave their informed consent. The local therapy board approved both the fetal interventions and the clinical study. Fetoscopic laser coagulation was performed under maternal sedation with Hypnovel® [midazolam] 5 mg and Atarax® [hydroxyzine] 100 mg orally one hour before the procedure. Local anesthesia of the skin and uterine wall was obtained using 1 % Xylocaine® [lidocaine] at the start of the session. The procedure was conducted using a Storz® 1.3 to 2 mm diameter fetoscope (Karl Storz Endoscopy®, Germany) with a right-angled or 30°-inclined lens passing through a right-angled or curved sheath depending on the placental localization. Depending on the fetoscope size, 8 to 12 French gauge trocars were also used. The trocar was inserted into the amniotic cavity of the larger twin. In order to facilitate the procedure, amnioinfusion was routinely conducted. Coagulation was achieved using a 400 μm laser diode fiber, with a maximum power of 40 Watts, which was extended through the fetoscope sheath. Coagulation was performed along the entire length of the membrane insertion. The entire procedure took place under ultrasound guidance. A prophylactic antibiotic treatment with 1 g Clamoxyl® [amoxicillin] was administered intravenously during the procedure. Routine tocolysis was not applied. A parenteral treatment with an antispasmodic was administered if the patient experienced pelvic pain. Fetal vital signs and hemodynamic criteria were checked by Doppler investigation 24 and 48 hours following the procedure. After the surgery, the patients were subjected to weekly and then bi-monthly ultrasound monitoring.

The choice of delivery method was based on the individual case and depended principally on the gestational age of the pregnancy, fetal presentations, cervical status and whether the situation was an emergency. If there was no spontaneous onset of labor at 36 WG, either induction or immediate cesarean was performed. Birth-weights were expressed as a percentile based on the French national growth curves [20].

Data analysis

All variables were collected prospectively and entered in the Diamm® electronic medical record system (Micro6® society, France). These variables included maternal biometric data, obstetrical characteristics, ultrasound findings and perinatal outcome.

Continuous variables were expressed as mean and standard deviation. Categorical variables were expressed as numbers and percentages.

Results

Study population

A total of 72 patients were followed during the study period. Of this total, 43 were excluded owing to TTTS, two because of TAPS, one because of fetal malformation and another because of IUFD at the time of diagnosis (Fig. 1). In the end, 25 pregnancies presenting sIUGR met the criteria for analysis.

Of these cases, 16 were type I and 9 types II or III. Maternal characteristics were similar for both groups with respect to maternal age, gravidity, parity and body mass index. Of the nine type II or III pregnancies, five underwent laser treatment.

Ultrasound data

The ultrasound data for cases of sIUGR with normal and abnormal umbilical Doppler findings are displayed in Table 1. Of

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