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Prevalence and management of late fetal complications following successful selective laser coagulation of chorionic plate anastomoses in twin-to-twin transfusion syndrome

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Feto-fetal transfusion syndrome
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Objective: This study was undertaken to report on the prevalence and management of late complications in twin-to-twin transfusion syndrome (TTTS) treated by laser therapy when both twins are alive 1 week after surgery.

Study design: A total of 151 consecutive TTTS cases were treated by selective fetoscopic laser therapy. Cases in which both twins were alive 1 week after surgery were followed up with ultrasound and Doppler examination, including middle-cerebral artery peak systolic velocity measurement (MCA-PSV).

Results: In the 151 cases treated with laser, both twins were still alive 7 days after the procedure in 101 cases. Intrauterine death of 1 and both twins occurred in 7 and 1 cases, respectively. Recurrence of TTTS with the polyhydramnios-oligohydramnios sequence occurred in 14 (14%) cases. In another 13 (13%) cases, amniotic fluid remained normal in both sacs, but MCA-PSV increased above 1.5 MoM in 1 twin and decreased concomitantly below 0.8 MoM in the co-twin. This was related to anemia and polycythemia, respectively, and resulted from unidirectional feto-fetal blood transfusion, mainly from former recipients into former donors. Late complications were managed accordingly by repeat laser, amnioreduction, cord coagulation, intrauterine blood transfusion, or elective delivery.

Conclusion: MCA-PSV Doppler measurements are useful in the follow-up of double survivors to detect and manage late complications after selective laser therapy.

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Twin-to-twin transfusion syndrome (TTTS) occurs in up to 15% of monochorionic twin pregnancies.[1] The diagnosis is made on ultrasound by the association of polyuric polyhydramnios in the recipient twin, with a deepest vertical pool (DVP) of amniotic fluid (AF) of at least 8.0 cm or 10 cm before or after 20 weeks of gestation, respectively, and oliguric oligohydramnios in the donor twin with a DVP of at most 2.0 cm.[2]

When untreated, the perinatal mortality is as high as 90%.[3] Currently, selective laser coagulation of the communicating vessels allows survival of at least 1 twin in 76% of severe cases presenting before 26 weeks' gestation.[2] Complications that occur in the first 6 days after laser surgery in TTTS pregnancies have been described.[2,4-8] These include single and double intrauterine death in 13% to 33% and in 3% to 22% of the cases, respectively.[2,4-8] In this study, we define late complications as those that occur at least 7 days after laser surgery. The objective of this study was 2-fold: (1) to report the prevalence of late complications that occur in TTTS treated with laser surgery, when both twins were alive, and (2) to describe our management in presence of late complications.

Population and methods

A total of 151 consecutive cases of severe TTTS were treated by fetoscopic selective laser coagulation of placental anastomoses in 2 referral centers over a 22-month period. To complete the outcome of the entire group, inclusions were limited to cases with an expected date of delivery before April 2004.

All data were recorded prospectively in a dedicated database maintained in each center. Fetal condition at diagnosis was assessed according to the Quintero staging system.[9] The DVP of AF in each sac was recorded as well as umbilical artery and ductus venosus Doppler waveforms. Absent end diastolic flow and reverse flow in the umbilical artery were classified as abnormal umbilical Doppler and absent a-wave or reverse flow in the ductus venosus were classified as abnormal ductus venosus flow. Middle cerebral artery peak systolic velocity (MCA-PSV) was measured before and after laser to screen for fetal anemia. In cases with single fetal demise, it was performed within 24 hours after fetal death for early detection of acute fetal exsanguination of the survivor.[10] Since January 2003, when both twins were alive after laser, MCA-PSV was also measured weekly in both twins to screen for intertwin discordance in hemoglobin levels. Measurements were performed as described by Mari et al[11,12] and using 1.5 MoM as a cut-off value to suspect fetal anemia.

The selective coagulation technique used in both centers has been described in detail elsewhere.[2] Briefly, all procedures were performed percutaneously under local or regional anesthesia; no laparotomy was performed. Three operators were involved (Y.V., J.D., J.P.B.). The site of entry on the maternal abdomen was chosen to allow access to the insertion of the intertwin membranes on the placental surface through the recipient's sac with the use of a 3.3-mm trocar and cannula under continuous ultrasound guidance. A 2-mm fetoscope (Karl Storz 11630, 50000 pixels, Storz Gmbh, Tuttlingen, Germany) and a 600-μm diameter diode laser fiber were used (Diode laser, Dornier Medilas, Paris, France). Vessels crossing the membranes were followed to selectively identify the anastomotic vessels in the recipient's sac. They were left intact when the examination could confirm that they belonged to 1 twin only but were otherwise coagulated with a nontouch technique by using an output of 30 to 60 W. AF was subsequently drained through the cannula to obtain a maximum deepest pool of 5 to 6 cm on ultrasound and the volume drained was recorded. After the procedure, the operator classified the procedure as difficult or not. The procedure was quoted as difficult when good visualization was impaired because of cloudy AF, perioperative intra-amniotic bleeding, or when there was an incomplete visualization of the vascular equator because of the fixed position of the donor twin or that of the intertwin membranes.

Pregnancy outcome included miscarriage, preterm delivery, preterm rupture of the membranes, and neonatal survival. Fetal complications were defined as intrauterine fetal death (IUFD), recurrence of TTTS, and isolated marked discordant hemoglobin (Hb) levels confining to anemia and polycythemia, respectively. Recurrent TTTS was defined as the recurrence of the polyuric polyhydramnios and oliguric oligohydramnios sequence. Isolated marked discordance in Hb concentrations was defined as severe anemia in 1 twin, together with polycythemia in its co-twin and normal amniotic fluid volume in both sacs. This situation was suspected whenever MCA-PSV was above 1.5 MoM in 1 twin, suggesting anemia,[11,12] together with a value below 0.8 MoM in the co-twin, suggesting polycythemia. Cordocentesis was performed in these cases and intrauterine blood transfusion (IUT) was peformed when Hb levels were less than 0.84 MoM,[10-12] which corresponds to the fifth percentile. Hemodilution with 20% serum-albumin was performed in the co-twin only in the event of marked polycythemia. Double IUFDs, recurrent TTTS, and isolated marked discordance in Hb levels were all considered as failure of surgery. Ultrasound and operative findings were compared between these groups. Gross examination and injection study of the placenta were performed whenever available to detect any missed anastomosis in surgical failure cases with double survivors or double IUFD.[13] Because of postmortem changes of the placenta, no injection study was performed in cases with only 1 survivor. Neonatal