

## **Perforation of the intertwin membrane and umbilical cord entanglement after laser surgery for twin-twin transfusion syndrome: prevalence, risk factors and outcome**

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### **Objective**

To assess the prevalence, risk factors and outcome of perforation of the intertwin membrane and umbilical cord entanglement after fetoscopic laser surgery for twin-twin transfusion syndrome (TTTS).

### **Methods**

In this multicenter retrospective study, we included all TTTS pregnancies treated with laser surgery between 2002 and 2020 in two fetal therapy centers, Shanghai (China) and Leiden (The Netherlands). We evaluated the occurrence of perforation of the intertwin membrane and cord entanglement after laser, based on routine biweekly ultrasound examination. We investigated the risk factors for perforation of the intertwin membrane and umbilical cord entanglement and the association with adverse outcome (a composite outcome defined as perinatal death or severe neurodevelopmental impairment at 2 years of age).

### **Results**

Perforation of the intertwin membrane occurred in 119 (16%) of the 763 TTTS pregnancies treated with laser surgery and was followed by umbilical cord entanglement in 20% (24/119). Perforation of the intertwin membrane was associated with higher laser power settings, 46 Watt versus 42 Watt respectively ( $p=0.03$ ) and a second fetal surgery procedure ( $p<0.001$ ). The group with perforation of the intertwin membrane had a higher rate of caesarean section and a lower mean gestational age at birth compared to the group with intact intertwin membrane, 77% versus 31% caesarean section ( $p<0.001$ ) and 30.7 versus 33.3 weeks of gestation at birth ( $p<0.001$ ). Adverse outcome was similar between the groups with and without perforation of the intertwin membrane (31% versus 36%,  $p=0.244$ ) and between the subgroups with and without cord entanglement (28% versus 25%,  $p=0.772$ ).

### **Conclusion**

Perforation of the intertwin membrane after laser occurred in 1 in 6 TTTS cases treated with laser and led to cord entanglement in at least 1 in 5. Both complications were not associated with adverse perinatal and/or long-term outcome.