

## OBSTETRICS

# Improvement in neurodevelopmental outcome in survivors of twin-twin transfusion syndrome treated with laser surgery

Jeanine M. M. van Klink, MSc; Hendrik M. Koopman, PhD; Erik W. van Zwet, PhD; Johanna M. Middeldorp, MD, PhD; Frans J. Walther, MD, PhD; Dick Oepkes, MD, PhD; Enrico Lopriore, MD, PhD

**OBJECTIVE:** To compare the incidence of neurodevelopmental impairment in surviving children from pregnancies with twin-twin transfusion syndrome (TTTS) treated with laser surgery between 2 time periods.

**STUDY DESIGN:** We compared the neurodevelopmental outcome between the first consecutive cohort of TTTS pregnancies treated with laser surgery from 2000 to 2005, with a cohort treated between 2008 and 2010. Neurologic, cognitive, and motor development was evaluated using Bayley scales at 2 years of age corrected for prematurity.

**RESULTS:** A total of 229 twin pregnancies were treated with laser surgery, 113 in the first cohort and 106 in the recent cohort. Overall survival increased from 70% (158/226) to 80% (170/212) ( $P = .014$ ).

The incidence of neurodevelopmental impairment decreased from 18% (28/152) to 6% (10/155) ( $P < .01$ ). In multivariate analysis, severe cerebral injury at birth was independently associated with neurodevelopmental impairment (odds ratio, 34.86; 95% confidence interval, 11.83–102.75;  $P < .01$ ).

**CONCLUSION:** Overall survival in TTTS has improved over time, with a concomitant reduction in the incidence of neurodevelopmental impairment. Research focused on prevention of cerebral injury is needed to further improve outcomes of these complicated twin pregnancies.

**Key words:** laser surgery, neurodevelopmental outcome, twin-twin transfusion syndrome

Cite this article as: van Klink JMM, Koopman HM, van Zwet EW, et al. Improvement in neurodevelopmental outcome in survivors of twin-twin transfusion syndrome treated with laser surgery. *Am J Obstet Gynecol* 2014;210:x-ex-x-ex.

Twin-twin transfusion syndrome (TTTS) is a major complication of monochorionic twin pregnancies and is the result of intertwin blood transfusion through placental vascular anastomoses. Fetoscopic laser coagulation of the anastomoses is considered by many specialists the treatment of choice because it was first described 2 decades ago.<sup>1,2</sup> Despite improved short-term and long-term outcomes with increasing

experience and advances in technique, TTTS treated with laser surgery is still associated with severe cerebral injury ranging from 3% to 16%<sup>3-6</sup> and neurodevelopmental impairment ranging from 8% to 18%.<sup>7</sup> Our objective was to compare the incidence of neurodevelopmental impairment in a cohort of TTTS pregnancies recently treated with laser surgery at our center between 2008 and 2010 with a previously published first cohort, treated at our center between 2000 and 2005.<sup>8</sup>

## MATERIALS AND METHODS

The Leiden University Medical Center serves as the national referral center for laser treatment in TTTS pregnancies in The Netherlands since 2000. Surviving children of all TTTS pregnancies treated with fetoscopic laser surgery were routinely assessed in our long-term outcome clinic since the start of our laser program, except, for organizational reasons, in the period between 2006 and 2007. We previously reported on the neurodevelopmental outcome at 2 years

of age of our first cohort, treated between 2000 and 2005. We evaluated neurodevelopmental outcome of all surviving children treated between 2008 and 2010, and compared the 2 groups.

TTTS was diagnosed by using standard prenatal ultrasound criteria<sup>9</sup> and staged according to standard criteria.<sup>10</sup> All fetoscopic laser procedures were performed by the same group of experienced operators during both study periods. Details on the laser technique used at our center and the short-term outcome results have previously been reported.<sup>11</sup> During the second study period, the majority of TTTS cases were also included in a randomized controlled trial, the Solomon study (NTR1245) comparing laser coagulation of the entire vascular equator, the Solomon technique, with the standard selective laser technique.

The following antenatal and neonatal data were recorded: gestational age at the time of laser treatment, stage of TTTS, occurrence of twin anemia-polycythemia sequence (TAPS) or recurrence of TTTS

From the Division of Neonatology, Department of Pediatrics (Ms van Klink and Drs Walther and Lopriore); Department of Clinical Psychology, Faculty of Social Sciences (Dr Koopman); and Departments of Biostatistics (Dr van Zwet) and Obstetrics (Drs Middeldorp and Oepkes), Leiden University Medical Center, Leiden, the Netherlands.

Received Sept. 30, 2013; revised Nov. 4, 2013; accepted Jan. 2, 2014.

The authors report no conflict of interest.

Reprints not available from the authors.

0002-9378/\$36.00

© 2014 Mosby, Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.ajog.2014.01.002>

after laser, fetal demise, gestational age at delivery, birthweight, severe cerebral injury and neonatal death. TAPS was diagnosed according to antenatal and/or postnatal criteria.<sup>12</sup> Severe cerebral injury was defined as intraventricular hemorrhage  $\geq$  grade III,<sup>13</sup> cystic periventricular leukomalacia  $\geq$  grade II,<sup>14</sup> ventricular dilatation  $\geq$ 97th percentile,<sup>15</sup> porencephalic cysts, arterial, or venous infarction detected on cerebral imaging. Socioeconomic status of the parents was registered as high, average, or low according to the Dutch Sociaal en Cultureel Planbureau.<sup>16</sup> The follow-up visit was assessed at age 2 years (corrected for prematurity) and included a physical and neurologic examination and an assessment of cognitive and motor development using the Dutch version of the Bayley Scales of Infant and Toddler Development second edition (BSID-II) in the old cohort and third edition (BSID-III) in the new cohort by certified examiners.<sup>17,18</sup> Both tests (BSID-II and BSID-III) provide a cognitive development and motor development score that follow a normal distribution with a mean of 100 and a standard deviation (SD) of 15. When each separate score was below 70, which is  $>2$  SD below the mean, this was indicative of a severe delay in either cognitive or motor development. A score below 85,  $>1$  SD below the mean, was indicative of at least mild to moderate delay. Cerebral palsy (CP) was defined according to the European CP Network and classified as diplegia, hemiplegia, quadriplegia, dyskinetic, or mixed.<sup>19</sup> A composite outcome, termed neurodevelopmental impairment (NDI), was defined as any of the following: CP, cognitive development score of less than 70, motor development score of less than 70, bilateral blindness, or bilateral deafness requiring amplification.

The primary aim of our study was to compare the incidence of NDI between both cohorts. The secondary aim was to determine risk factors associated with NDI. The institutional review board of the Leiden University Medical Center approved the study and all parents gave

**TABLE 1**  
**Baseline characteristics for the entire cohort**

Characteristic	Cohort 2000-2005, n = 113 pregnancies	Cohort 2008-2010, n = 106 pregnancies	P value
<b>SES</b>			
Low	32/113 (28)	27/106 (25)	.65
Intermediate	55/113 (49)	44/106 (41)	.34
High	26/113 (23)	35/106 (33)	.31
Gestational age at laser, wks	20.1 $\pm$ 3.1	20.1 $\pm$ 3.3	.93
<b>Quintero stage, n (%)</b>			
I	11 (10)	14 (13)	.53
II	49 (43)	30 (28)	.02
III	46 (41)	61 (58)	.02
IV	7 (6)	1 (1)	.07
Fetal demise	58/113 (26)	33/106 (16)	.01
Single	20/113 (9)	19/106 (9)	$>$ .99
Double	38/113 (17)	14/106 (7)	$<$ .01
TAPS or recurrent TTTS	15/113 (13)	16/106 (15)	.59
TAPS	9/113 (8)	15/106 (14)	.04
Recurrent TTTS	6/113 (5)	1/106 (1)	.02
Gestational age at birth, wks	34 (5)	32 (6)	$<$ .01
Birthweight, g	1982.5 (1258)	1700 (870)	$<$ .01
Severe cerebral injury	16/168 (10)	11/179 (6)	.32
Neonatal death	10/168 (6)	9/179 (5)	.90
Overall perinatal survival	158/226 (70)	170/212 (80)	.01

Data are presented as mean  $\pm$  standard deviation, median (interquartile range), n (%) or n/N (%).

SES, socioeconomic status; TAPS, twin anemia-polycythemia sequence; TTTS, twin-twin transfusion syndrome.

Van Klink. Neurodevelopment over time in twin-twin transfusion syndrome. *Am J Obstet Gynecol* 2014.

written informed consent for their children.

### Statistics

Data are reported as means with SD or as medians with interquartile range, as appropriate. Statistical analysis was performed using the *t* test and Mann-Whitney test for continuous variables. The  $\chi^2$  test and Fisher exact test were used for categorical variables, as appropriate. Analysis for risk factors possibly contributing to the neurodevelopmental impairment was conducted using univariate and multivariate regression methods. The following potential risk factors for neurodevelopmental impairment were studied in a univariate logistic

regression model: gestational age at laser surgery, Quintero stage, fetal demise of 1 twin, gestational age at delivery, birthweight, treatment failure defined as postlaser TAPS or recurrent TTTS, and severe cerebral injury. The multivariate logistic regression model included all variables that showed significant association in the univariate analysis. Results are expressed as odds ratio (OR) with 95% confidence interval (CI). All analyses were conducted using the generalized estimated equation module to account for the effect that observations within twins are not independent. A *P* value of less than .05 was considered significant. Statistical analysis was executed with computer

Download English Version:

<https://daneshyari.com/en/article/6145086>

Download Persian Version:

<https://daneshyari.com/article/6145086>

[Daneshyari.com](https://daneshyari.com)