CERPO
Centro de Referencia Perinatal Oriente
Facultad de Medicina, Universidad de Chile

Seminario Nº73: Secuencia Anemia Policitemia / TRAP

Dra. Daniela Luna S.
Dr. Daniel Martin N, Dr. Juan Guillermo Rodríguez A., Dr. Sergio de la Fuente G., Dra. Susana Aguilera P.

Julio, 2021.-

Secuencia Anemia Policitemia

Incidencia:

- 3-5 % de los embarazos monocoriales espontánea.
- 3-16 % post terapia de STFF.
  - Técnica de Solomon disminuyó a 2-6 %.

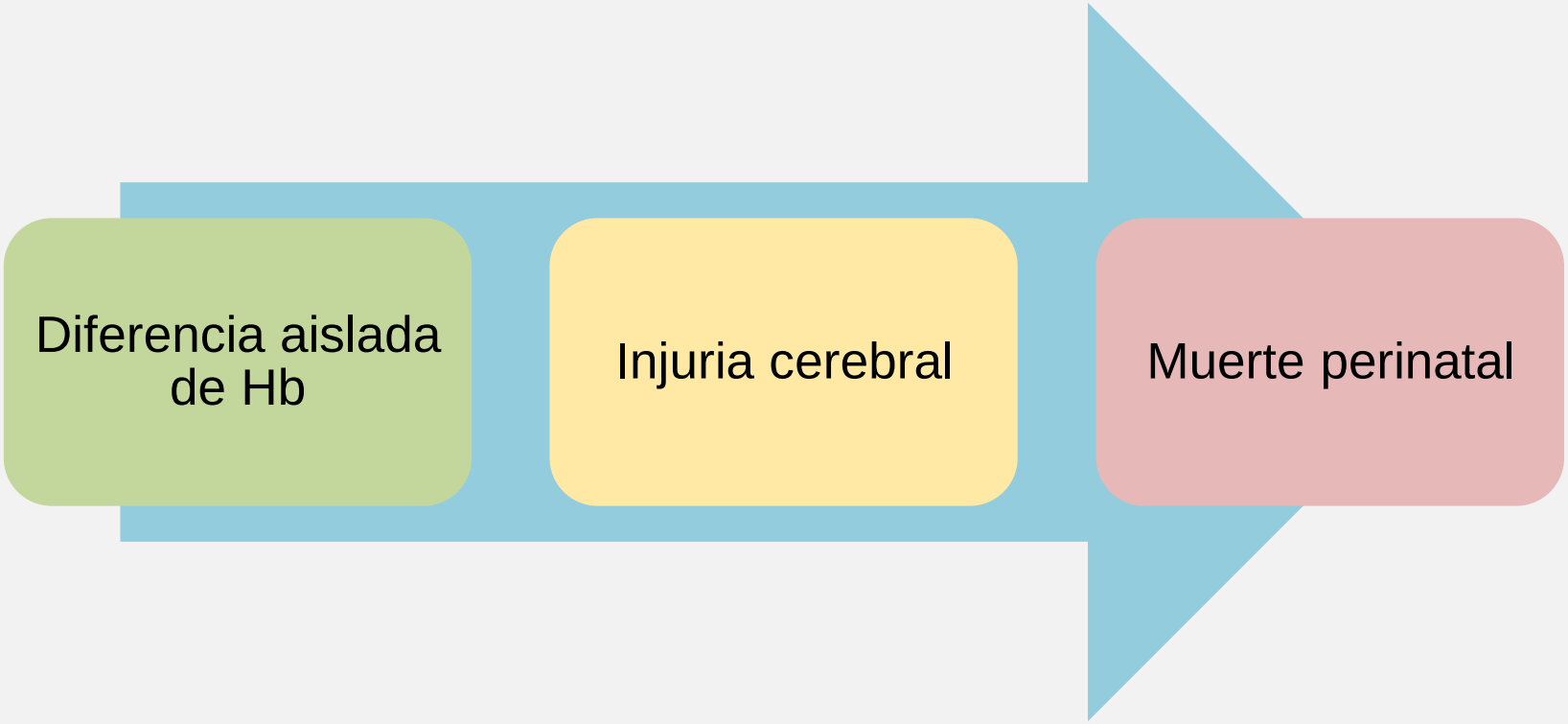
› Fetal Diagn Ther. 2012;31(3):170-8. doi: 10.1159/000336227. Epub 2012 Mar 23.

Fetal and maternal complications after selective fetoscopic laser surgery for twin-to-twin transfusion syndrome: a single-center experience

M A Rustico [1], M M Lanna, S Faiola, V Schena, M Dell'avanzo, V Mantegazza, C Parazzini, G Lista, B Scelsa, D Consonni, E Ferrazzi

150 casos de SAP espontáneo entre 2004 y 2009, 17 centros.
Objetivo: caracterizar los outcomes de los SAP.
Porcentaje de **complicaciones:**
MFIU: doble 7,6%, única: 36%.
Recurrencia 11,3%, **SAP: 3,3%.**

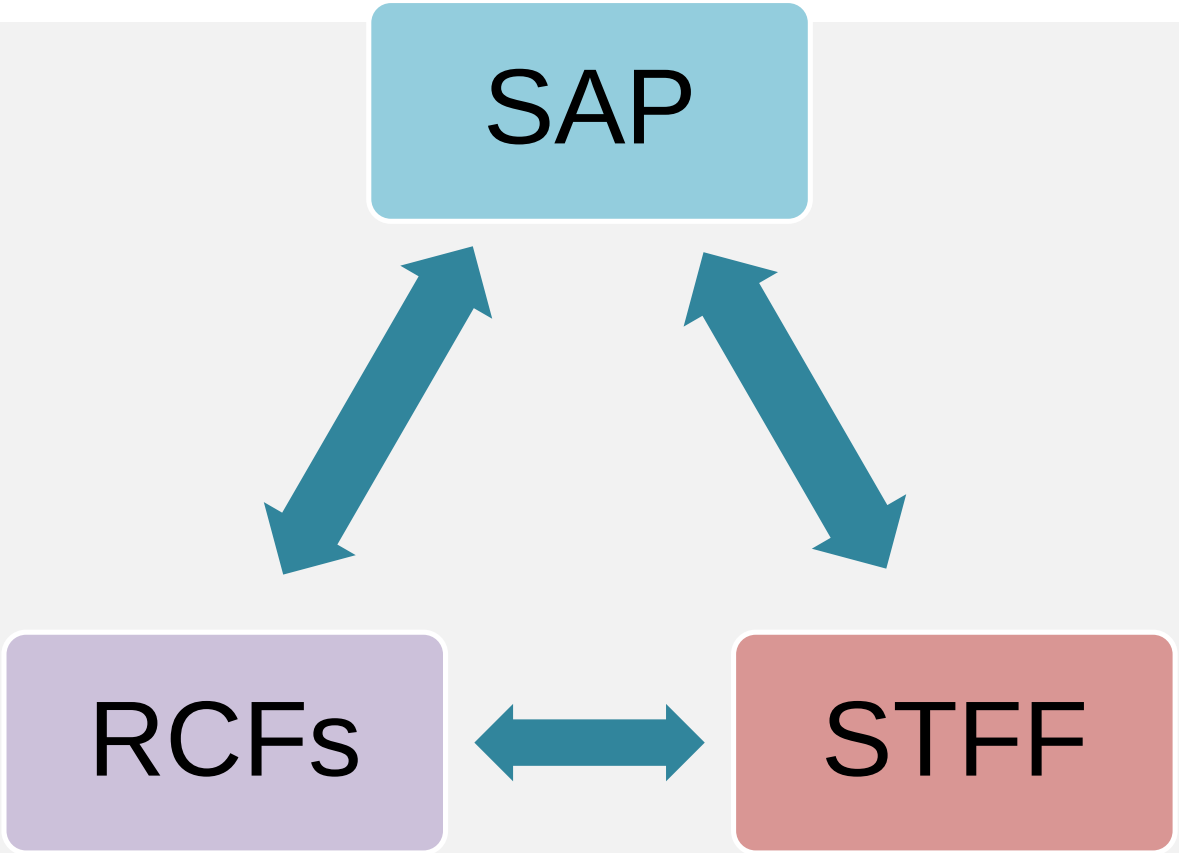
SAP: ¿Cuál es su importancia?



Secuencia Anemia Policitemia

- **Características:**
  - Anastomosis AV < de 1 mm. Raro AA.
  - Es como una STFF desbalanceada crónica.
  - Espontáneamente puede provocarse entre las 15-35 semanas.
  - Ocurre sin OHA ni PHA.

Concomitancia de condiciones



CERPO

Centro de Referencia Perinatal Oriente

Facultad de Medicina, Universidad de Chile

CERPO

Twin-Twin Transfusion Syndrome with Anemia-Polycythemia: Prevalence, Characteristics, and Outcome

Lisanne S. A. Tollenaar [1,*], Femke Slaghekke [1], Jeanine M. M. van Klink [2], Sophie G. Groene [2], Johanna M. Middeldorp [1], Monique C. Haak [1], Frans J. C. M. Klumper [1], Dick Oepkes [1] and Enrico Lopriore [2]

- 2.4% a 15 % coexistencia TAPS +STFF.
- Pronóstico podría ser mejor.

J. Clin. Med. **2019**, *8*, 1129; doi:10.3390/jcm8081129

- AGREGAR CONCOMITANCIA CON RCIU

Diagnóstico

Fetal Diagnosis and Therapy

Mini-Review

Fetal Diagn Ther 2010;27:181–190
DOI: 10.1159/000304512

Twin Anemia-Polycythemia Sequence: Diagnostic Criteria, Classification, Perinatal Management and Outcome

F. Slaghekke[a] W.J. Kist[a] D. Oepkes[a] S.A. Pasman[a] J.M. Middeldorp[a]
F.J. Klumper[a] F.J. Walther[b] F.P.H.A. Vandenbussche[a] E. Lopriore[b]

[a]Division of Fetal Medicine, Department of Obstetrics, and [b]Division of Neonatology, Department of Pediatrics, Leiden University Medical Center, Leiden, The Netherlands

PRENATAL

Donante	Receptor	LA
• PS ACM >1,5 MoM.	• PS <1 MoM.	• Sin PHA • Sin OHA.

Postnatal: diferencia Hb neonatal 8 g/dl y al menos uno de los siguientes:

- Relación reticulocitos >1,7.
- Anastomosis < 1 mm.

SAP: clasificación

CERPO

Table 2. Antenatal TAPS classification

Antenatal stage	Findings at Doppler ultrasound examination
Stage 1	MCA-PSV donor >1.5 MoM *and* MCA-PSV recipient <1.0 MoM, without other signs of fetal compromise
Stage 2	MCA-PSV donor >1.7 MoM *and* MCA-PSV recipient <0.8 MoM, without other signs of fetal compromise
Stage 3	as stage 1 or 2, with cardiac compromise of donor, defined as critically abnormal flow[a]
Stage 4	hydrops of donor
Stage 5	intrauterine demise of one or both fetuses preceded by TAPS

[a] Critically abnormal Doppler is defined as absent or reversed end-diastolic flow in umbilical artery, pulsatile flow in the umbilical vein, increased pulsatility index or reversed flow in ductus venosus.

Table 3. Postnatal TAPS classification

Postnatal stage	Intertwin Hb difference, g/dl
Stage 1	>8.0
Stage 2	>11.0
Stage 3	>14.0
Stage 4	>17.0
Stage 5	>20.0

Evidencia

Multicenter Study > Ultrasound Obstet Gynecol. 2015 Oct;46(4):432-6.
doi: 10.1002/uog.14925. Epub 2015 Sep 7.

Middle cerebral artery peak systolic velocity to predict fetal hemoglobin levels in twin anemia–polycythemia sequence

F Slaghekke [1], S Pasman [2], M Veujoz [3], J M Middeldorp [1], L Lewi [2], R Devlieger [2], R Favre [3], E Lopriore [4], D Oepkes [1]

- Estudio de cohorte 116 mediciones, 2005-2013.
- **Objetivo:** Evaluar la precisión diagnóstica de PS-ACM (MoM) con los niveles de Hb fetal postnatal.
- **Resultados:** Los valores de MoM se correlacionaron con los niveles de Hb (r = - 0.86; P < 0.001).

S de 1,5 MoM para predecir anemia severa (Hb deficit >5 SD) en los donantes 94%, E 74% VPP 76 y VPN 94%.

S de <1.0 MoM para predecir policitemia (Hb > 5 SD) en el receptor FUE 97%, E 96%, VPP 93% y VPN 99%.

Ultrasound Obstet Gynecol 2019; 53: 788–793
Published online 6 May 2019 in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.20096.

Improved prediction of twin anemia–polycythemia sequence by delta middle cerebral artery peak systolic velocity: new antenatal classification system

L. S. A. TOLLENAAR[1], E. LOPRIORE[2], J. M. MIDDELDORP[1], M. C. HAAK[1], F. J. KLUMPER[1], D. OEPKES[1] and F. SLAGHEKKE[1]

[1]*Division of Fetal Medicine, Department of Obstetrics, Leiden University Medical Center, Leiden, The Netherlands;* [2]*Division of Neonatology, Department of Pediatrics, Leiden University Medical Center, Leiden, The Netherlands*

- **Método:** Cohorte retrospectivo, 2003-2017. Emb gemelar MCBA dg post natal de TAPS. 45 sin TAPS y 35 con TAPS.
- **Objetivo:** evaluar la predicción de delta >0,5 MoM comparado con >1,5 MoM en el donante y < 0,8 MoM en el receptor para el dg de TAPS.

La S y E de MCA-PSV (donante> 1,5 MoM, receptor <1,0 MoM) para TAPS fue del 46% y del 100%, respectivamente.
VPP 100% y VPN 70%.

Delta MCA-PSV: S 83% y E100%, VPP 100%, VPN 88%.
Buena correlación entre Delta y diferencia de Hb intergemelar postnatal. ($R = 0.725$, $P < 0.01$).

Nueva clasificación propuesta

CERPO

Table 5 Proposed antenatal classification system for twin anemia–polycythemia sequence (TAPS)

Antenatal stage	*Previous criteria*	*Proposed criteria*
Stage 1	MCA-PSV donor > 1.5 MoM, recipient < 1.0 MoM; without signs of fetal compromise	Delta MCA-PSV > 0.5 MoM; without signs of fetal compromise
Stage 2	MCA-PSV donor > 1.7 MoM, recipient < 0.8 MoM; without signs of fetal compromise	Delta MCA-PSV > 0.7 MoM; without signs of fetal compromise
Stage 3	As Stage 1 or 2; with cardiac compromise of donor*	As Stage 1 or 2; with cardiac compromise of donor*
Stage 4	Hydrops of donor	Hydrops of donor
Stage 5	Intrauterine demise of one or both fetuses preceded by TAPS	Intrauterine demise of one or both fetuses preceded by TAPS

*Defined as critically abnormal flow: Doppler shows absent or reversed end-diastolic flow in umbilical artery, pulsatile flow in umbilical vein and/or increased pulsatility index or reversed flow in ductus venosus. MCA-PSV, middle cerebral artery peak systolic velocity; MoM, multiples of the median.

Ultrasound Obstet Gynecol 2020; 56: 388–394
Published online in Wiley Online Library (wileyonlinelibrary.com). **DOI:** 10.1002/uog.21882

Consensus diagnostic criteria and monitoring of twin anemia–polycythemia sequence: Delphi procedure

A. KHALIL[1,2,3], S. GORDIJN[4], W. GANZEVOORT[5], B. THILAGANATHAN[1,2], A. JOHNSON[6], A. A. BASCHAT[7], K. HECHER[8], K. REED[9], L. LEWI[10], J. DEPREST[10], D. OEPKES[11] and E. LOPRIORE[11]

- 132 expertos, valorar los criterios dg de TAPS, por escala de Likert.
- Monitorización cada 2 semanas, sin acuerdo en la EG de inicio.
- Gravedad establecerla por PS-ACM.
- Hecho el dg de SAP→ control semanal.

Criterios Dg PRENATAL:

MCA-PSV ≥ 1,5 MoM en el gemelo anémico y ≤ 0,8 MoM en el gemelo policitemico.

Alternativamente, delta MCA-PSV ≥ 1 MoM entre gemelos.

POSTNATAL:

Delta de Hb ≥ 8 g / dL.

Ratio reticulocitos: entre gemelos ≥ 1. 7.

TRATAMIENTO:

No hubo acuerdo sobre el punto de corte de MCA-PSV o su discordancia para la intervención prenatal.

Journal of *Clinical Medicine*

MDPI

CERPO

Article

Performance of Antenatal Diagnostic Criteria of Twin-Anemia-Polycythemia Sequen

J. Clin. Med. **2020**, *9*, 2754; doi:10.3390/jcm9092754

Becky Liu [1,2], Erkan Kalafat [1,3,4], Amar Bhide [1], Basky Thilaganathan [1,5] and Asma Khalil [1,2,4,*]

Table 3. Diagnostic accuracy of traditional, delta PSV > 0.5 MoM, and Delphi consensus criteria, according to postnatal hemoglobin *.

	Accuracy (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)	TP	TN	FP	FN
Traditional criteria	44.4 (21.5–69.2)	14.3 (0.36–57.9)	63.6 (30.8–89.1)	1	7	4	6
Delta PSV > 0.5 MoM	50.0 (26.0–74.0)	85.7 (42.1–99.6)	27.3 (6.0–61.0)	6	3	8	1
Delphi consensus	55.6 (30.8–78.5)	28.6 (3.7–71.0)	72.7 (39.0–94.0)	2	8	3	5

CI—confidence interval; TP—true positive; TN—true negative; FP—false positive; FN—false negative. The numbers in accuracy, sensitivity, and specificity columns are percentages. The numbers in the remainder of columns are count data. * This information is available in only 18 fetuses. Predictive accuracy analysis for delta PSV > 0.373 MoM is not possible because the criteria applies to all 49 fetuses in the study.

Journal of Clinical Medicine

MDPI

Article

Middle Cerebral Artery Doppler Velocimetry for the Diagnosis of Twin Anemia Polycythemia Sequence: A Systematic Review

Clifton O. Brock [1], Eric P. Bergh [1,2], Kenneth J. Moise, Jr. [1,2], Anthony Johnson [1,2], Edgar Hernandez-Andrade [1], Dejian Lai [3] and Ramesha Papanna [1,2,*]

CERPO

Table 4. Diagnostic characteristics of TAPS by MCA-PSV compared with Hb difference.

Characteristic	De Sousa 2019	Tollenaar 2019	Fishel-Bartal 2016	Slaghekke 2015	Veujoz 2015
Interval between MCA-PSV and Hb measurement	2 (0–7) days	<1 week	<1 week	–	<48 h
Antenatal finding for diagnosis of TAPS	ΔMCA-PSV > 0.373 MOM (cutoff determined by ROC analysis)	(1) MCA-PSV < 1.0 MOM (recipient), MCA-PSV > 1.5 MOM(donor) (2) ΔMCA-PSV > 0.5 MOM	(1) MCA-PSV < 1.0 MOM (recipient), MCA-PSV > 1.5 MOM (donor) (2) ΔMCA-PSV by ROC analysis. (ROC cutoff not reported)	MCA-PSV < 1.0 MOMs (recipient), MCA-PSV > 1.5 MOMs (donor)	MCA-PSV < 1.0 MOMs (recipient), MCA-PSV > 1.5 MOMs (donor)
Postnatal finding for diagnosis of TAPS	Hb difference > 90% (7.25 Hb)	Hb difference > 8 g/dL and Reticulocyte Ratio > 1.7 or anastomoses < 1mm	Anemia: Hct < 45% Polycythemia: Hct > 65%	Anemia: Hct > 5 SD below mean Polycythemia: Hct > 5 SD above mean	Hb difference > 8 g/dL and Reticulocyte Ratio > 1.7 or anastomoses < 1mm
AUC (95% CI)	0.976 (0.935–0.993)	Not reported	(1) Anemia: 0.687 (0.547–0.827) Polycythemia: 0.617 (0.505–0.728) (2) TAPS 0.871 (0.757–0.985)	Not Reported	Not Reported
Sensitivity (95% CI)	93.3% (68.1–99.8)	(1) 46% (30–62) (2) 83% (67–92)	Not reported	Anemia: 94% (85–98) Polycythemia: 97% (87–99)	71%
Specificity (95% CI)	95.7% (90.8–98.4)	(1) 100% (29–100) (2) 100% (92–100)	Not reported	Anemia: 74% (62–83) Polycythemia: 96% (89–99)	50%
PPV (95% CI)	70.0% (45.7–88.1)	(1) 100% (81–100) (2) 100% (88–100)	Not reported	Anemia: 76% (65–85) Polycythemia: 93% (93–100)	88%
NPV (95% CI)	99.3% (95.9–100)	(1) 70% (58–80) (2) 88% (77–94)	Not reported	Anemia: 94% (83–98) Polycythemia: 99% (93–100)	33%

Abbreviations: AUC = area under the curve, Hb = hemoglobin concentration, MCA-PSV = middle cerebral artery peak systolic velocity, ΔMCA-PSV = difference in MCA-PSV between twins, MoM = multiples of the median, TAPS = twin anemia polycythemia sequence, wk = week.

CERPO

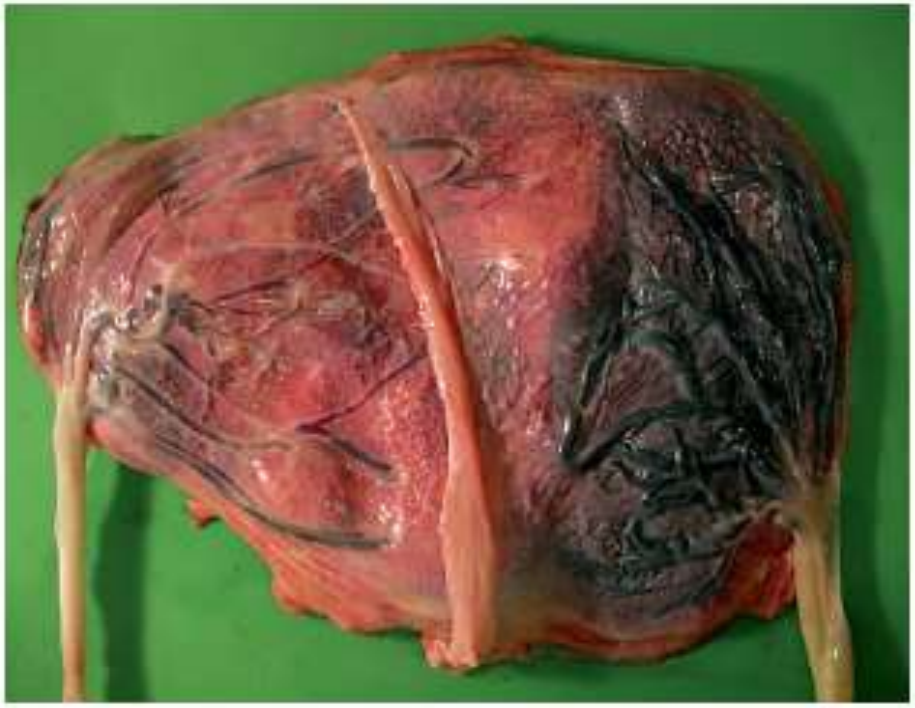


Fig. 1. Characteristic placenta in a spontaneous TAPS case, before color dye injection, showing the pale placental share of the donor (left) and the plethoric share of the recipient (right).

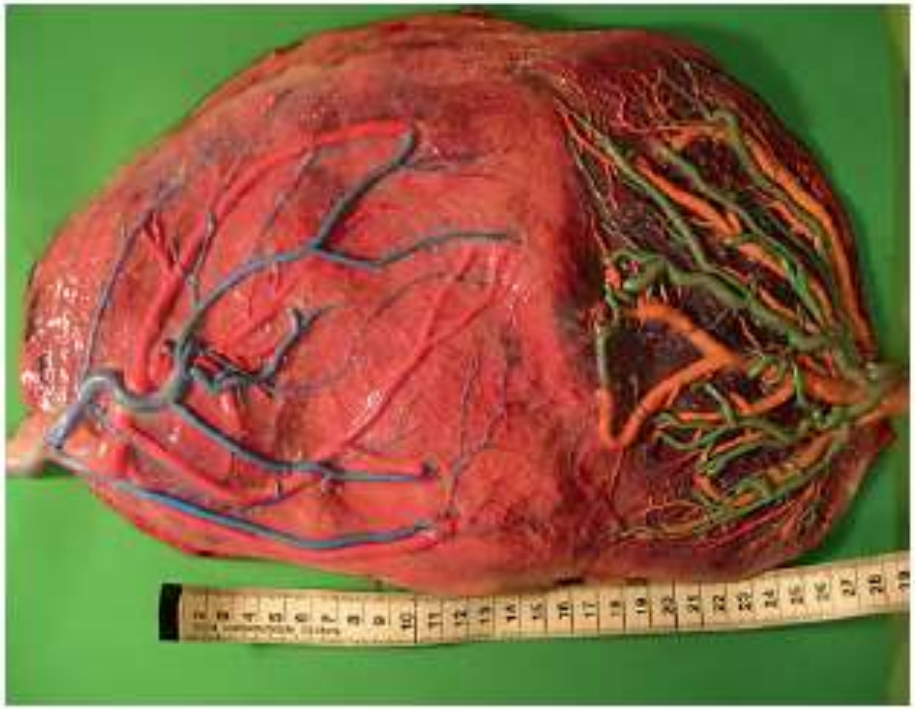


Fig. 2. Color dye injection shows the presence of only a few very small anastomoses.

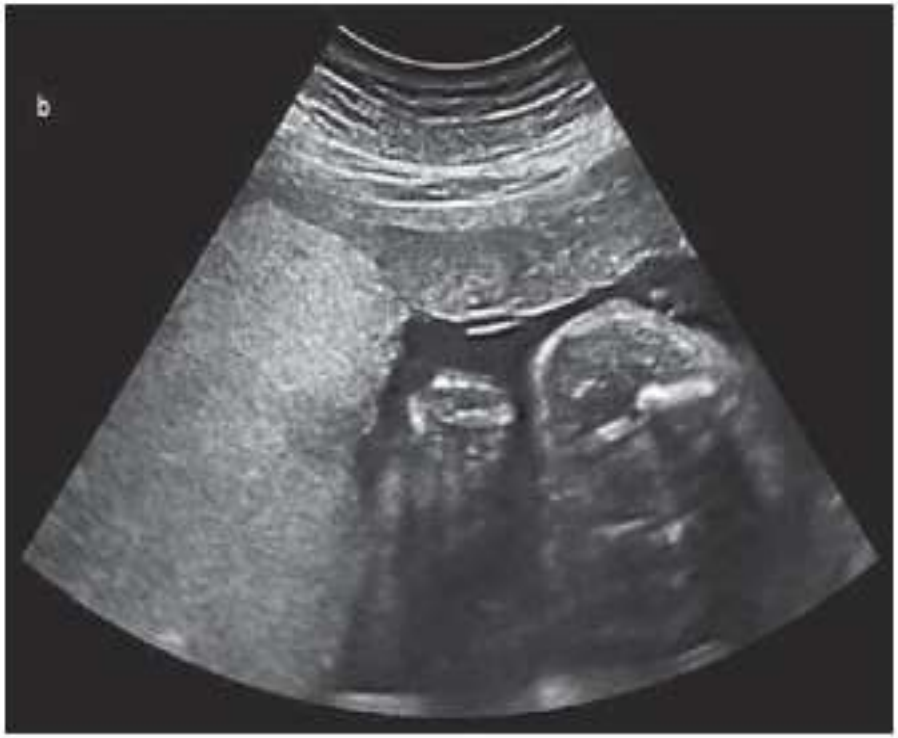


Fig. 3. Ultrasound image of a TAPS placenta showing the difference in echodensity and thickness. On the left side the hydropic placenta part of the anemic donor twin and on the right side the normal aspect of the placenta of the recipient can be seen.

Fig. 4. Spontaneous TAPS twin pair at birth: a pale anemic donor (left) and a plethoric polycythemic recipient (right).

Otros hallazgos ecográficos

- **Dicotomía placentaria:**

  →***Hiperecogénica:*** Donante.

  →***Hipoecogénica:*** Receptor.

  →Diferencia de grosor.

- **Cardiomegalia en Donante.**

  →Por hipoxia y por >GC.

- **Hígado "Starry sky":**

  → Identificación de las vénulas en parénquima disminuido de ecogenicidad el gemelo receptor.

are made.

Prevalence of placental dichotomy, fetal cardiomegaly and starry-sky liver in twin anemia–polycythemia sequence

L. S. A. TOLLENAAR[1], E. LOPRIORE[2], J. M. MIDDELDORP[1], F. J. C. M. KLUMPER[1], M. C. HAAK[1], D. OEPKES[1] and F. SLAGHEKKE[1]

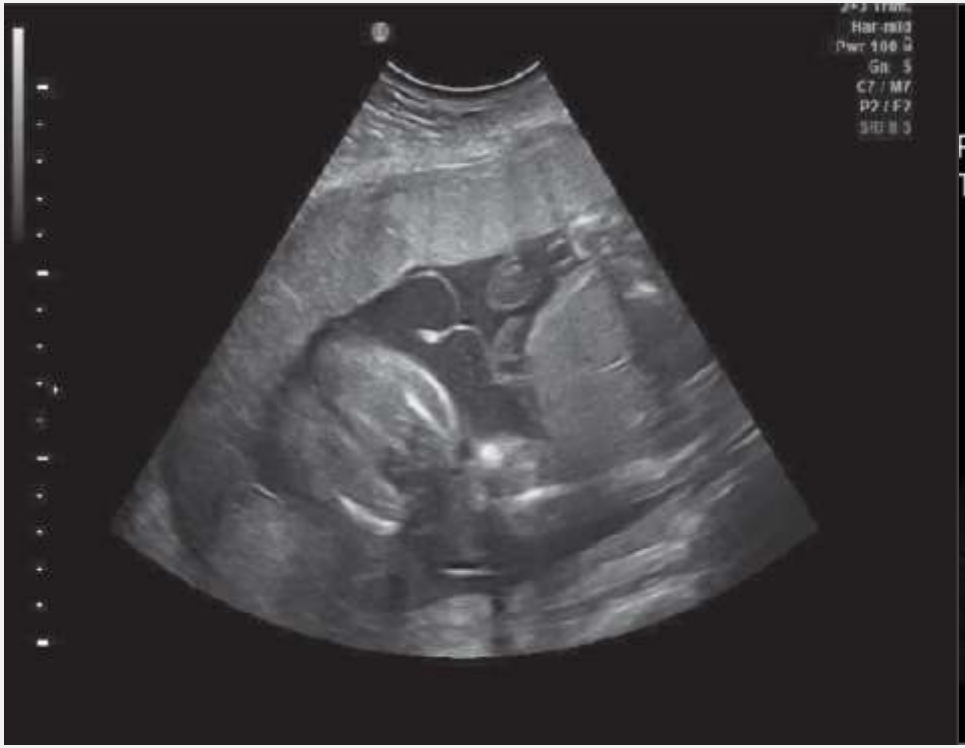
[1]*Division of Fetal Medicine, Department of Obstetrics, Leiden University Medical Center, Leiden, The Netherlands;* [2]*Division of Neonatology, Department of Pediatrics, Leiden University Medical Center, Leiden, The Netherlands*

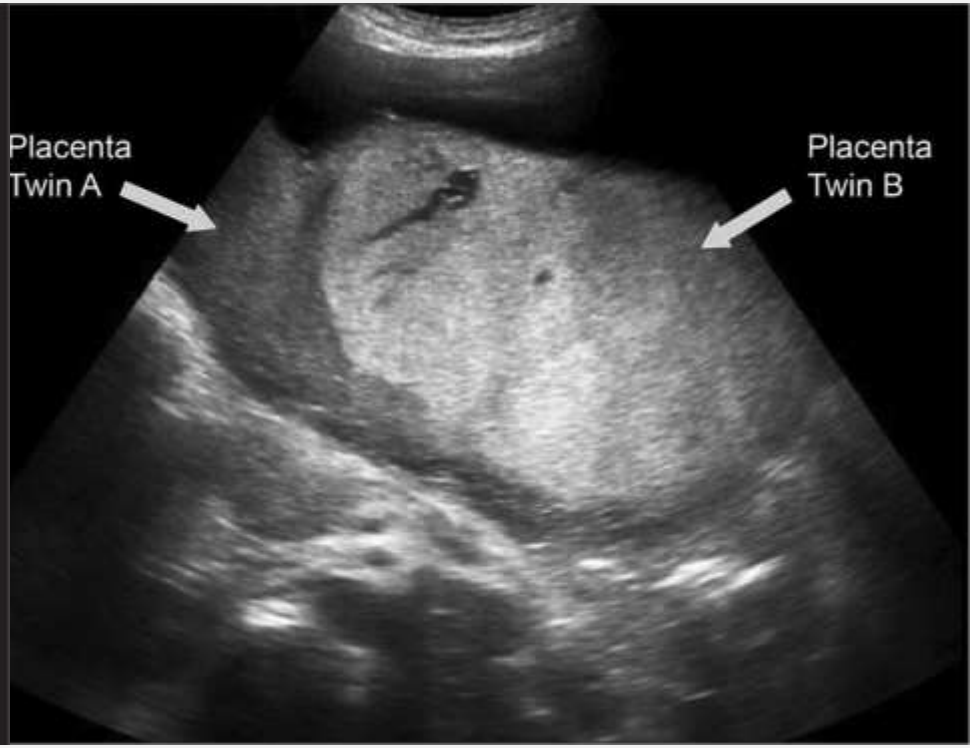
- Estudio retrospectivo de 91 embarazos MCBA, con dg de SAP, desde el 2006 al 2009.
- **Dg** de SAP por delta de ACM >0,5 MoM.
- **Objetivo:** Determinar la prevalencia de otros signos ecográficos para el dg de SAP.

Dicotomía placentaria: 44%.
→ Espontáneo: 63%; post láser: 23%.
Cardiomegalia: 70% de los donantes.
Hígado Starry sky: 66% de los receptores.

Al menos 1 de los marcadores se presentó en el 86% de los casos.

CERPO

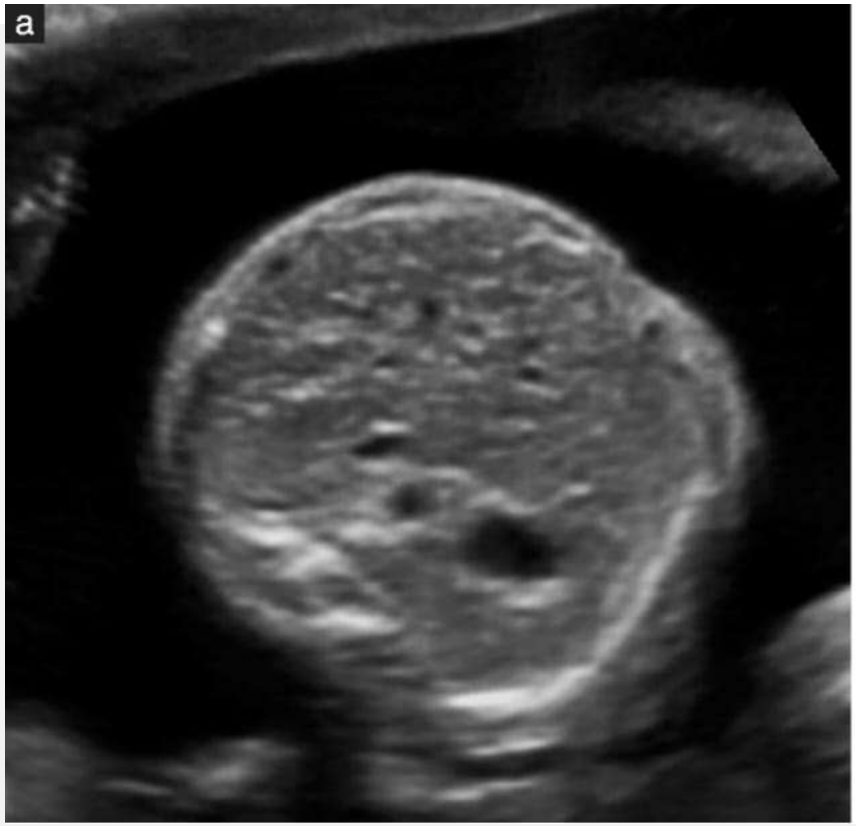


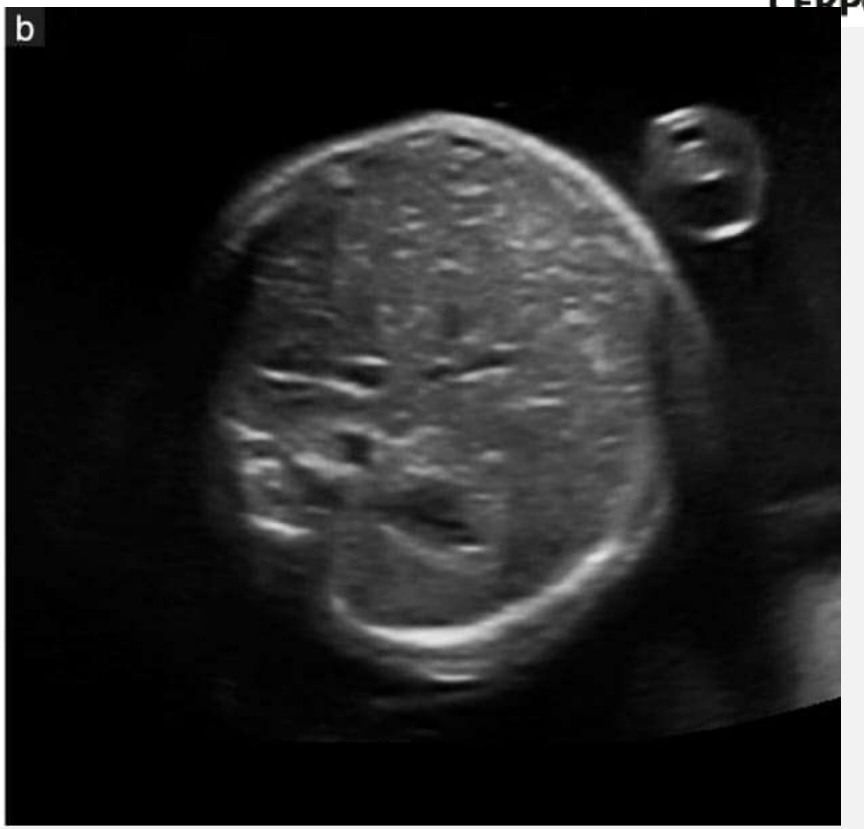


CERPO

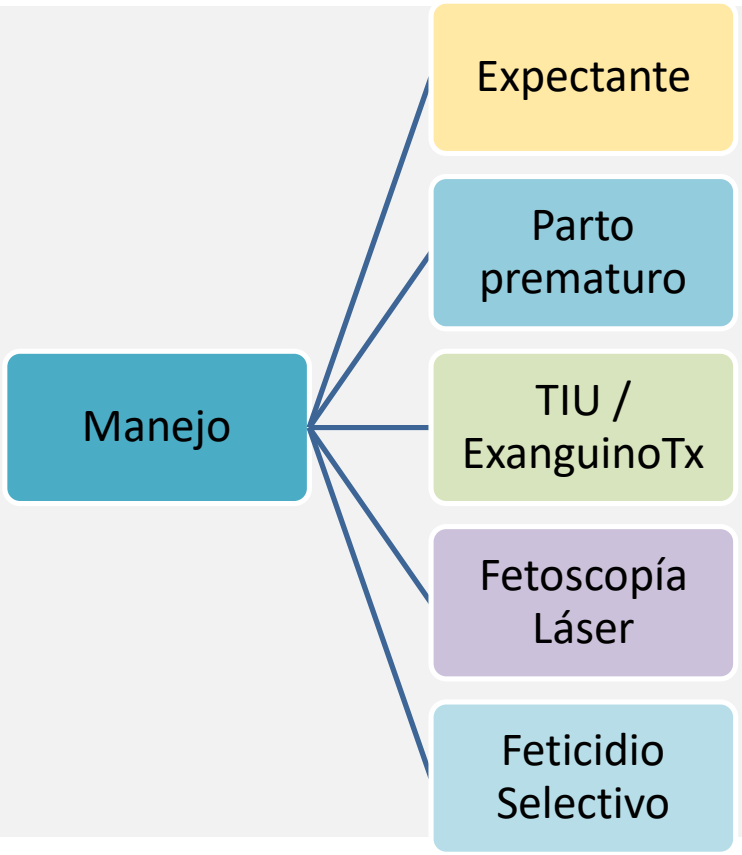
Centro de Referencia Perinatal Oriente

Facultad de Medicina, Universidad de Chile



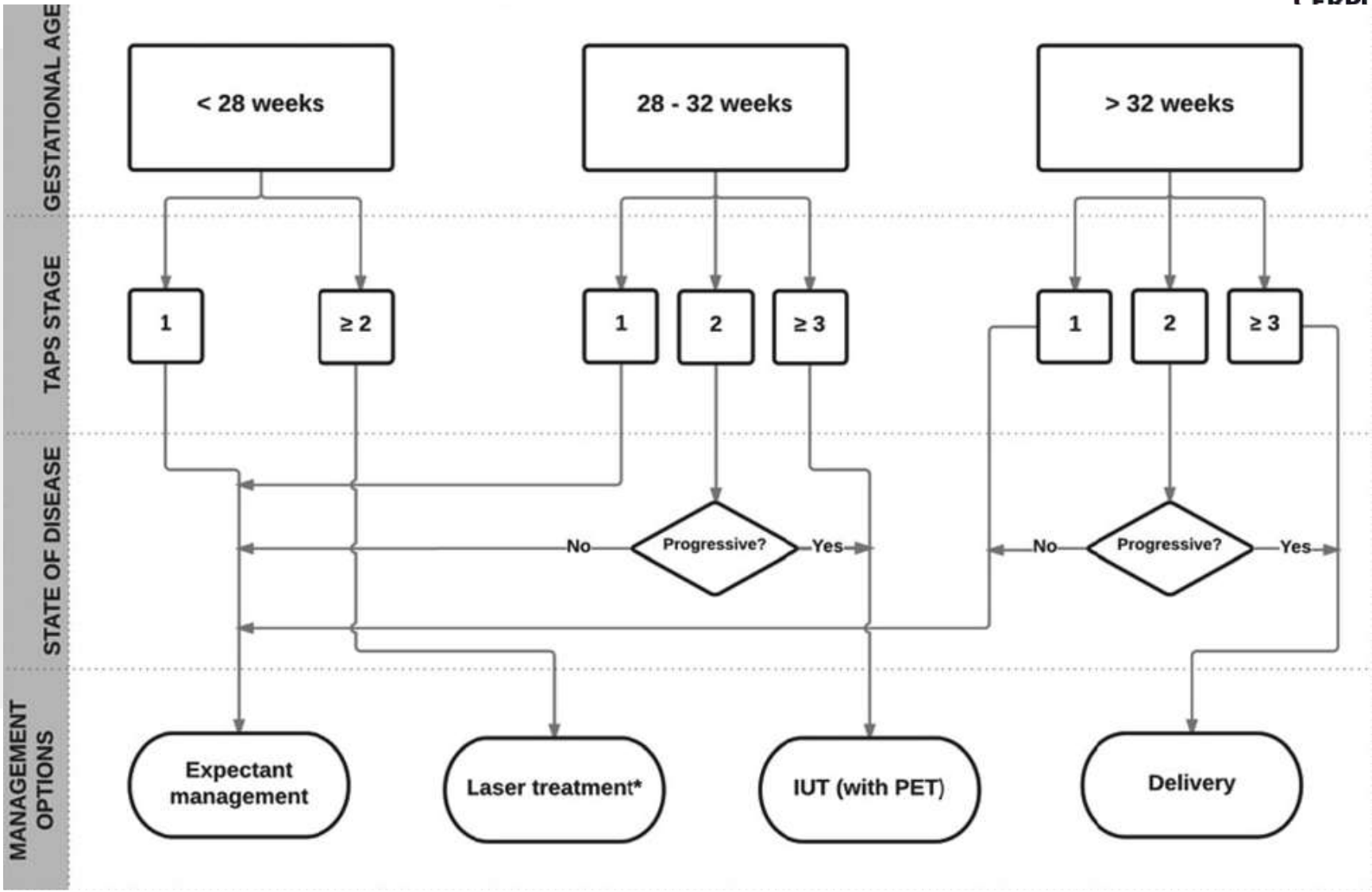


SAP: Alternativas de Manejo



- Baja prevalencia.
- Poco conocimiento sobre manejo óptimo para resultados a largo y corto plazo.
- Dificulta la consejería.

Manejo (Tollenaar et al 2016)



Resultados

Fetal Diagnosis and Therapy

Mini-Review

Fetal Diagn Ther 2010;27:181–190
DOI: 10.1159/000304512

Twin Anemia-Polycythemia Sequence: Diagnostic Criteria, Classification, Perinatal Management and Outcome

F. Slaghekke[a] W.J. Kist[a] D. Oepkes[a] S.A. Pasman[a] J.M. Middeldorp[a]
F.J. Klumper[a] F.J. Walther[b] F.P.H.A. Vandenbussche[a] E. Lopriore[b]

[a]Division of Fetal Medicine, Department of Obstetrics, and [b]Division of Neonatology, Department of Pediatrics, Leiden University Medical Center, Leiden, The Netherlands

Table 4. Perinatal management and outcome in 18 antenatal TAPS cases detected at our center

	Expectant management	IUT	IUT + laser	Laser	Selective feticide	TOP
Pregnancies, n	10	4[a]	1	1	1	1
GA at diagnosis, weeks	24 (20–29)	24 (21–28)	24	18	19	18
GA at delivery, weeks	34 (32–41)	29 (26–29)	32	36	28	18
Perinatal survival, n/N	15/20 (75%)	8/8 (100%)	2/2 (100%)	2/2 (100%)	1/2 (50%)	0
Postnatal treatment[b], n/N	7/15 (47%)	8/8 (100%)	0	0	0	0

GA = Gestational age (median, range); n/N = number per total number.
[a] Including 1 patient treated with intraperitoneal transfusion at 26 weeks' gestation (pregnancy still ongoing).
[b] Postnatal treatment is defined as blood transfusion due to neonatal anemia and/or partial exchange transfusion due to polycythemia-hyperviscosity syndrome. TOP = Termination of pregnancy.

Ultrasound Obstet Gynecol 2020; 56: 378–387
Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.22042.

Treatment and outcome of 370 cases with spontaneous or post-laser twin anemia–polycythemia sequence managed in 17 fetal therapy centers

L. S. A. TOLLENAAR[1], F. SLAGHEKKE[1], L. LEWI[2], Y. VILLE[3], M. LANNA[4], A. WEINGERTNER[5], G. RYAN[6], S. ARÉVALO[7], A. KHALIL[8,9], C. O. BROCK[10], P. KLARITSCH[11], K. HECHER[12], G. GARDENER[13], E. BEVILACQUA[14], K. V. KOSTYUKOV[15], M. O. BAHTIYAR[16], M. D. KILBY[17], E. TIBLAD[18], D. OEPKES[1], E. LOPRIORE[19] and Collaborators*

- 2014-2019. TAPS espontáneos o post láser. Dg clásico.
- **Aternativas de manejo:** expectante, parto dentro de los 7 días al dg, tiu con o sin etp, cx láser y feticidio selectivo.
- **Outcomes:** Mortalidad Perinatal y morbilidad neonatal grave.
- **Resultados:** 370 emb, 31% expectante, 30% laser, 19% TIU, 12% parto, 8% feticidio, 1% interrupción.
- **Mortalidad:** 17% expectantes, 18% láser, 18% TIU, 10% parto, 7% cotwins en feticidio selectivo.
- Mayor prolongación del embarazo con feticidio selectivo→ cx láser→manejo expectante.

Table 2 Outcome of 366 monochorionic twin pregnancies diagnosed prenatally with twin anemia–polycythemia sequence (TAPS), according to initial management strategy after diagnosis

Outcome	*Expectant management (n = 113 pregnancies; n = 226 fetuses)*	*Laser surgery (n = 110 pregnancies; n = 220 fetuses)*	*IUT (± PET) (n = 70 pregnancies; n = 140 fetuses)*	*Delivery (n = 43 pregnancies; n = 86 fetuses)*	*Selective feticide (n = 30 pregnancies; n = 30 cotwins)*	P
GA at birth (weeks)	33.0 (30.1–34.9)	31.8 (29.1–34.1)[d]	31.1 (28.3–33.0)†‡	31.9 (29.1–34.1)	32.1 (27.7–34.8)	< 0.001
Diagnosis-to-birth interval (weeks)	7.8 (3.8–14.4)	9.7 (6.6–12.7)	4.0 (2.0–6.9)‡	0.3 (0–0.5)†‡	10.5 (4.2–14.9)	< 0.001
Perinatal mortality	39/225 (17)[a]	38/215 (18)[d]	25/140 (18)	9/86 (10)	2/30 (7)†	0.177
Fetal demise*	24/226 (11)	28/215 (13)	18/140 (13)	0/86 (0)†‡	2/30 (7)	0.024
Neonatal mortality*	15/201 (7)[a]	10/187 (5)[d]	7/122 (6)	9/86 (10)†	0/28 (0)	0.280
Survivors						
None	5/112 (4)[a]	8/107 (7)[d]	3/70 (4)	1/43 (2)	2/30 (7)	0.700
One	27/112 (24)[a]	20/107 (19)[d]	18/70 (26)	7/43 (16)	28/30 (93)	< 0.001
Two*	80/112 (71)[a]	79/107 (74)[d]	49/70 (70)	35/43 (81)	0/30 (0)	< 0.001
At least one	107/112 (96)[a]	99/107 (93)[d]	67/70 (96)	42/43 (98)	28/30 (93)	0.696
Severe neonatal morbidity	60/193 (31)[b]	57/182 (31)[e]	56/122 (46)‡	41/84 (49)[h]†‡	7/28 (25)	0.027
Severe cerebral injury*	10/193 (5)[b]	6/182 (3)[e]	13/122 (11)†	8/84 (10)[h]	0/28 (0)	0.098
Postnatal TAPS	66/89 (74)	6/65 (9)	36/51 (71)	36/43 (84)	—	< 0.001
BT or PET at birth for TAPS*	81/188 (43)[c]	13/171 (8)[f]†	60/118 (51)[g]	48/84 (57)[h]	0/23 (0)[i]	< 0.001

Data are presented as median (interquartile range) or *n*/*N* (%). Data missing for: [a]one infant with unknown neonatal outcome; [b]nine infants (one with unknown neonatal outcome, three that died shortly after birth and five with unknown neonatal morbidity); [c]14 infants (same as 'b' plus five cases with missing BT/PET data); [d]five infants (three pregnancies) with missing outcome; [e]10 fetuses (same as 'd' plus five with missing neonatal outcome); [f]21 infants (same as 'e' plus 11 with unknown BT/PET data); [g]four infants with missing BT/PET data; [h]two infants that died shortly after birth; [i]five cotwins with missing BT/PET data. For comparisons using one-way analysis of variance and generalized estimated equation (all outcomes per fetus/neonate and continuous outcomes per pregnancy), expectant management was set as reference. For comparisons using chi-square test (categorical outcomes per pregnancy), *P*-values are for comparison between all treatment groups. *Statistical correction for non-occurring events was applied. †Smallest *P*-value, which is presented in *P*-value column. ‡Statistically significant *P*-value. BT, blood transfusion; GA, gestational age; IUT, intrauterine transfusion; PET, partial exchange transfusion.

Journal of
Clinical Medicine

MDPI

Article

Post-Laser Twin Anemia Polycythemia Sequence: Diagnosis, Management, and Outcome in an International Cohort of 164 Cases

Resultados de TAPS post láser (164), 92% con dg prenatal.

2014-2019.

Outcome primario: mortalidad perinatal y la morbilidad neonatal grave.

Outcome 2dario: factores de riesgo para la mortalidad perinatal y la morbilidad neonatal grave.

Manejo expectante 43%.
TIU con o sin exanguinotransfusión:29%.
Tto Láser: 15%
Feticidio selectivo: 7%.
Parto 6%.
Terminación del embarazo 1%.

CERPO

- **Mortalidad perinatal** 25%; 37% donantes y 14% receptores (*p* <0,001).
- **Morbilidad neonatal grave** en el 40%, donantes (43%; 51/118) y los receptores (37%; 54/145), *p* = 0,568.

- Los **factores de riesgo independientes** para la mortalidad perinatal espontánea fueron:
- **Etapa 4 del TAPS prenatal** (OR = 3,4; IC del 95%: 1,4-26,0; *p* = 0,015).
- **Ser donante de TAPS** (OR = 4,2; IC del 95%: 2,1-8,3; *p* <0,001).
- **EG al nacer** (OR = 0,8; IC del 95%: 0,7-0,9; *p* = 0,001).

La morbilidad neonatal grave se asoció significativamente con la EG al nacer (OR = 1,5, IC del 95%: 1,3-1,7, *p*<0,001).

ULTRASOUND
in Obstetrics & Gynecology

isuog

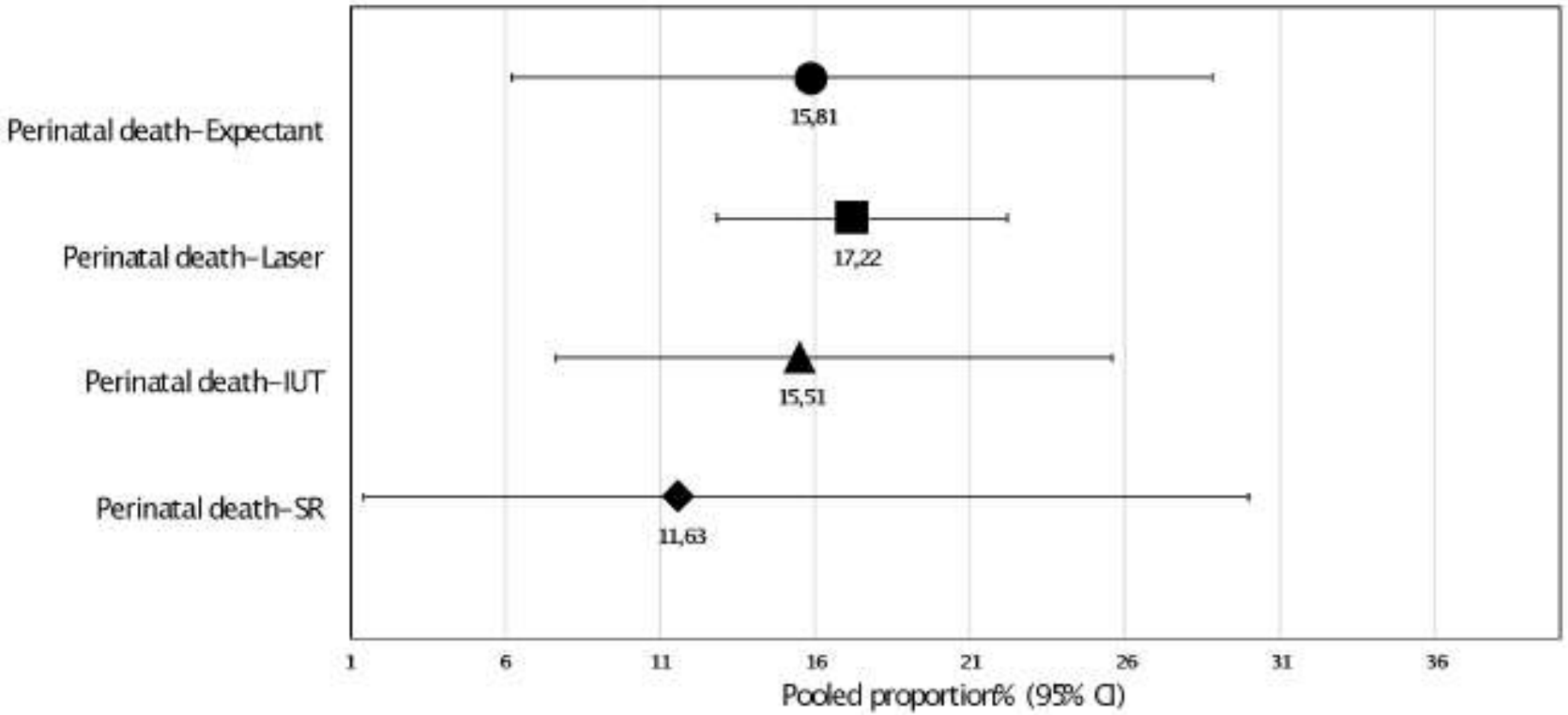
Systematic Review or Meta-Analysis | Full Access

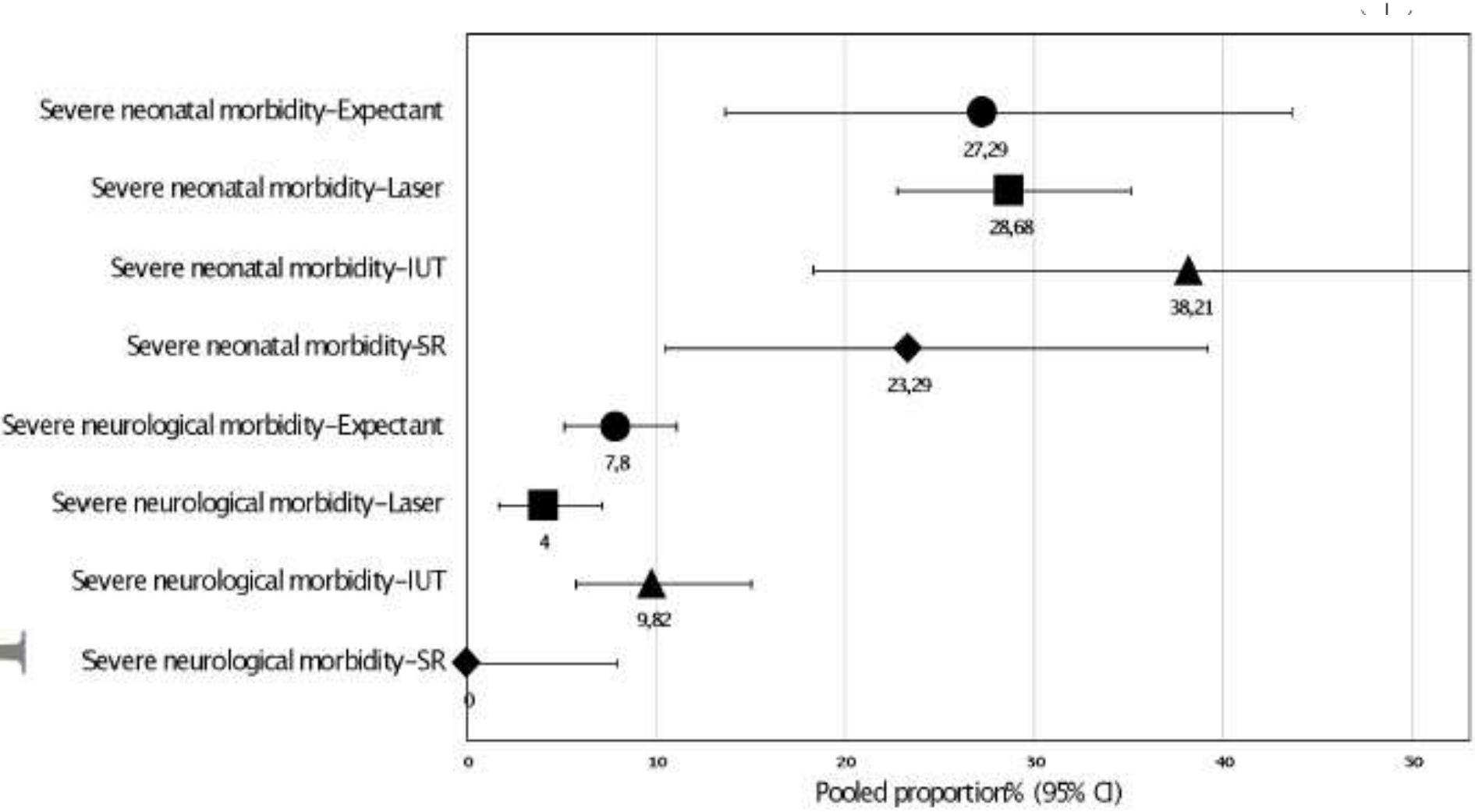
Perinatal outcomes of pregnancies complicated by twin anemia–polycythemia sequence: a systematic review and meta-analysis

V. Giorgione, F. D'Antonio, A. Manji, K. Reed, A. Khalil

First published: 11 January 2021 | https://doi-org.uchile.idm.oclc.org/10.1002/uog.23585

- FMIU 5.32 % de los TAPS espontáneos vs. 10.2 % de los TAPS post láser.
- Muerte NN: 4% espontáneo y 9,2% post láser.
- Morbilidad neonatal severa: 29,3% espontáneo y 33.3%.
- Morbilidad neurológica 4,0% vs 11%.
- PP: 86% espontáneo Y 100% post láser.


Perinatal death–Expectant
Perinatal death–Laser
Perinatal death–IUT
Perinatal death–SR
15,81
17,22
15,51
11,63
1
6
11
16
21
26
31
36
Pooled proportion% (95% CI)



Sin diferencias en morbilidad y mortalidad entre los diferentes manejos comparando los diferentes estudios (40 estudios).

OBSTETRICS

Spontaneous twin anemia polycythemia sequence: diagnosis, management, and outcome in an international cohort of 249 cases

Lisanne S. A. Tollenaar, BSc; Femke Slaghekke, MD, PhD; Liesbeth Lewi, MD, PhD; Claire Colmant, MD, PhD; Mariano Lanna, MD, PhD; Anne Sophie Weingertner, MD, PhD; Greg Ryan, MB; Silvia Arévalo, MD, PhD; Philipp Klaritsch, MD, PhD; Manuela Tavares de Sousa, MD, PhD; Asma Khalil, MD, PhD; Ramesha Papanna, MD, PhD; Glenn J. Gardener, MD, PhD; Elisa Bevilacqua, MD, PhD; Kirill V. Kostyukov, MD, PhD; Mert O. Bahtiyar, MD, PhD; Mark D. Kilby, MD, DSc; Eleonor Tiblad, MD, PhD; Dick Oepkes, MD, PhD; Enrico Lopriore, MD, PhD

- Estudio Multicentrico, 17 centros, publicado en el 2021. Retrospectivo 2014-2019.
- Criterios clásicos.

SUPPLEMENTAL TABLE 2

Univariable and multivariable risk analysis for spontaneous perinatal mortality in spontaneous twin anemia polycythemia sequence

	Death[a] (n=42/463)	Alive[a] (n=421/463)	Univariable analysis OR (95% CI)	SE	*P* value	Multivariable[d] analysis OR (95% CI)	SE	*P* value
GA at diagnosis of TAPS	22.7±4.8	24.7±5.4	0.9 (0.8–1.0)	0.05	.124			
Antenatal TAPS stage								
1	2/126 (2)	124/126 (98)	—[b]					
2	17/162 (11)	145/162 (89)	7.2 (1.5–32.2)	0.8	.009[e]	6.3 (1.4–27.8)	0.8	.016[e]
3	14/91 (15)	77/91 (85)	11.3 (2.5–50.5)	0.8	.002[e]	9.6 (2.1–45.5)	0.8	.005[e]
4	8/15 (35)	18/15 (65)	32.5 (5.7–186.7)	0.9	<.001[e]	20.9 (3.0–146.4)	1.0	.002[e]
Recipient[c]	12/236 (5)	224/236 (95)	—[b]					
Donor[c]	30/219 (14)	189/219 (86)	3.0 (1.7–5.4)	0.3	<.001[e]	3.8 (1.9–7.5)	0.3	<.001[e]
Antenatal therapy								
Expectant management	12/101 (10)	89/101 (88)	—[b]					
Delivery	5/68 (7)	63/68 (93)	0.6 (0.2–1.8)	0.6	.334			
IUT (±PET)	2/52 (4)	50/52 (96)	0.3 (0.1–1.4)	0.9	.118			
Laser surgery	21/163 (13)	142/163 (87)	1.1 (0.5–2.5)	0.4	.865			
Selective feticide (cotwin)	2/17 (11)	17/19 (89)	0.9 (0.2–4.3)	0.8	.855			
GA at birth	29.5±4.7	32.6±2.9	0.8 (0.7–0.9)	0.1	<.001[e]	0.8 (0.7–0.9)	0.1	.001[e]

Values are odds ratios (OR) (95% confidence intervals [CIs]), standard error (SE), and *P* value.

GA, gestational age; *IUT*, intrauterine transfusion; *PET*, partial exchange transfusion; *SNM*, severe neonatal morbidity; *TAPS*, twin anemia polycythemia sequence.

[a] A total of 30 cases were excluded as mortality occurred in context of selective feticide or termination of pregnancy, from the 648 cases 5 cases have missing values; [b] Set as a reference; [c] In 5 cases, donor-recipient status was unknown; [d] Antenatal TAPS stage, donor status, and GA at birth were not correlated (antenatal TAPS stage and donor status [R<0.000; *P*=.998], antenatal TAPS stage and GA at birth [R<0.001; *P*=1.000], and GA at birth and donor status [R <0.000; *P*=.997]), so all parameters were included in multivariable analysis; [e] Statistical significance.

Tollenaar et al. Spontaneous TAPS: diagnosis management and outcome in 249 cases. Am J Obstet Gynecol 2021.

SUPPLEMENTAL TABLE 3

Univariable and multivariable risk analysis for severe neonatal morbidity in spontaneous twin anemia polycythemia sequence

	SNM[a] (n=141/432)	No SNM[a] (n=291/432)	Univariable analysis, OR (95% CI)	SE	*P* value	Multivariable analysis, OR (95% CI)	SE	*P* value[b]
GA at diagnosis of TAPS	25.4±5.2	24.5±5.6	1.0 (0.9–1.0)	0.02	.300	–	–	–
Antenatal TAPS stage								
1	40/123 (33)	83/123 (67)	—					
2	44/148 (30)	104/148 (70)	0.9 (0.5–1.7)	0.3	.651	0.7 (0.3–1.6)	0.4	.414
3	31/82 (38)	51/82 (62)	1.1 (0.6–2.4)	0.4	.749	1.0 (0.4–3.0)	0.5	.953
4	14/19 (74)	5/19 (26)	4.4 (1.2–16.0)	0.7	.026	7.9 (1.4–43.3)	0.8	.018[e]
Recipient[c]	74/226 (33)	153/226 (67)	—[b]					
Donor[c]	63/196 (32)	133/196 (68)	1.1 (0.8–1.3)	0.1	.628	—	—	—
Antenatal management								
Expectant management	26/93 (28)	67/93 (72)	—[b]					
Delivery	32/68 (47)	35/68 (53)	2.3 (1.0–5.6)	0.4	.046	0.5 (0.1–1.5)	0.5	.252
IUT (±PET)	22/50 (44)	28/50 (56)	1.9 (0.8–4.6)	0.5	.150	1.3 (0.4–4.0)	0.6	.695
Laser surgery	44/145 (31)	108/145 (69)	1.2 (0.5–2.4)	0.4	.661	1.6 (0.6–4.9)	0.6	.370
Selective feticide	4/17 (24)	13/17 (76)	0.8 (0.2–2.8)	0.6	.710	—[d]		
GA at birth	30.1±2.7	33.6±2.3	1.7 (1.5–1.9)	0.1	<.001[e]	1.7 (1.5–2.1)	0.1	<.001[e]
Severe growth restriction, no	99/304 (33)	205/304 (67)	—[b]					
Severe growth restriction, yes	41/122 (34)	81/122 (66)	1.0 (0.7–1.5)	0.2	.842	-	-	-
Postnatal TAPS, no	40/156 (26)	116/156 (74)	—[b]					
Postnatal TAPS, yes	81/211 (38)	130/211 (62)	1.9 (1.0–3.3)	0.3	.039[e]	2.1 (0.9–5.0)	0.4	.068

There was no strong correlation between antenatal TAPS stage, antenatal management, GA at birth, and postnatal TAPS (GA at birth and postnatal TAPS [R<0.001; *P*=1.000]; antenatal TAPS stage and postnatal TAPS [R=−0.155; *P*=.006]; antenatal management [R=−0.493; *P*<.001]; GA at birth and antenatal TAPS stage [R=−0.209; *P*<.001]; GA at birth and antenatal management [R=0.154; *P*=.002]; antenatal management and antenatal TAPS stage [R=0.307; *P*<.001]), so all were included in multivariable analysis.

Values are presented as odds ratios (OR) (95% confidence intervals [CI]), standard error (SE), and *P* value.

GA, gestational age; *IUT*, intrauterine transfusion; *PET*, partial exchange transfusion; *SNM*, severe neonatal morbidity; *TAPS*, twin anemia polycythemia sequence.

[a] A total of 12 neonates with missing neonatal outcome; [b] Set as a reference; [c] In 5 cases, donor-recipient status was unknown; [d] Group too small to calculate OR in multivariable analysis; [e] Statistical significance.

Tollenaar et al. Spontaneous TAPS: diagnosis management and outcome in 249 cases. Am J Obstet Gynecol 2021.

TABLE 4
Perinatal outcome for spontaneous twin anemia polycythemia sequence

	Spontaneous TAPS (n=249 pregnancies, 498 fetuses)	TAPS donors[a] (n=244 fetuses)	TAPS recipients[a] (n=244 fetuses)	*P* value
GA at birth (wk)	32.3 (30.1–34.9; 18.7–39.6)	—	—	—
Fetal demise[b]	54/494 (11)	43/243 (18)	11/243 (5)	<.001[f]
Spontaneous	24/494 (5)	19/243 (8)	5/243 (2)	.002[f]
Intended	30/494 (6)	24/243 (10)	6/243 (3)	<.001[f]
Neonatal mortality[c]	18/439 (4)	11/200 (6)	7/231 (3)	.161
Perinatal mortality (overall)[c]	72/493 (15)	54/243 (22)	18/242 (7)	<.001[f]
Perinatal mortality (spontaneous)[c]	42/493 (9)	30/243 (12)	12/242 (5)	<.001[f]
Severe neonatal morbidity[d]	141/432 (33)	63/196 (32)	74/228 (33)	.652
Respiratory distress syndrome	118/432 (27)	51/196 (26)	64/228 (28)	.413
Patent ductus arteriosus	34/432 (8)	15/196 (8)	19/228 (8)	.671
Necrotizing enterocolitis	15/432 (4)	7/196 (4)	8/228 (4)	.905
Retinopathy of prematurity	7/432 (2)	3/196 (2)	4/228 (2)	.778
Severe cerebral injury	15/432 (4)	4/196 (2)	11/228 (5)	.109
Ischemic limb injury	0/432 (0)	0/196 (0)	0/196 (0)	1.000
Birthweight (g)[d]	1645±609	1483±566	1765±620	<.001[f]
Severe growth restriction (bw at <p3)[e]	126/434 (29)	98/200 (49)	26/228 (11)	<.001[f]
Mild growth restriction (bw at <p10)[e]	211/434 (49)	135/200 (68)	71/228 (31)	<.001[f]

Data are presented as mean±SD medians (IQR) or n/N (%).

bw, birthweight; *GA*, gestational age; *TAPS*, twin anemia polycythemia sequence; *SD*, standard deviation.

[a] In 5 of 249 cases, the donor-recipient status was unknown; [b] A total of 4 missing values; [c] A total of 5 missing values (same as [a] plus 1 missing value from a liveborn recipient with unknown neonatal mortality information); [d] A total of 12 missing values (same as [b], plus 4 cases with unknown neonatal morbidity information and 3 cases who died shortly after birth); [e] A total of 9 missing values (as in [a] plus 5 cases with unknown birthweights); [f] Statistical significance.

Tollenaar et al. Spontaneous TAPS: diagnosis management and outcome in 249 cases. Am J Obstet Gynecol 2021.

Conclusiones

CERPO

- SAP puede ocurrir en desde el segundo trimestre (15-35 semanas)
- Se debe seguir las recomendaciones de seguimiento de la ISUOG
- La utilización del criterio de MCA-PVS Delta > 0.5 tendría mayor sensibilidad que criterios clásicos.
- Búsqueda dirigida de otros signos ecográficos.
- Si se diagnostica TAPS siempre buscar asociación con RCIU SELECTIVO y STFF.
- Faltan estudios randomizados sobre manejo y pronóstico.

TRAP: twin reversed arterial perfusion

CERPO

- Ocurre en el 1% de los embarazos gemelares monocoriales.
- Anastomosis AA: sangre poco oxigenada al feto ”parásito”.
- Eventual falla cardíaca feto bomba.

→Sin función cardíaca.

Manifestación extrema de TFF.
Mortalidad: 51% y prematurez 71%.
Entre las 16-18 semanas: 60% cese espontáneo del flujo del acárdico y 60% de muerte y daño cerebral en el gemelo bomba.

TRAP: twin reversed arterial perfusion

Terapias descritas:

- Inserción de coils en el cordón umbilical.
- Ligadura con o sin sección transversal del cordón umbilical.
- Coagulacíon láser de anastomosis entre gemelos.
- Coagulación láser bipolar o monopolar guiada por eco de los vasos del cordón del gemelo acardio.
- Ablación de vasos intrafetal con láser monopolar, radiofrecuencia o inyección de OH.
- Terminación del embarazo.

TRAP: twin reversed arterial perfusion

Optimal Method and Timing of Intrauterine Intervention in Twin Reversed Arterial Perfusion Sequence: Case Study and Meta-Analysis

Petya Chaveeva[a] Leona C. Poon[a] Alexandros Sotiriadis[c] Przemek Kosinski[a]
Kypros H. Nicolaides[a, b]

2003-2013. 96 gemelos y 12 triples con TRAP, 53 estudios.

- **Manejo: Terapia entre las 12-15: 67%.**
- **Baja probabilidad de amniorexis y aborto.**
- **En láser intrafetal monopolar no hay beneficio de retrasar el procedimiento en cuanto a tasa de superviviencia.**
- **Disminuye el riesgo de PP.**
- **Coagulación bipolar o radiofrecuencia tiene mayor riesgo de AE.**

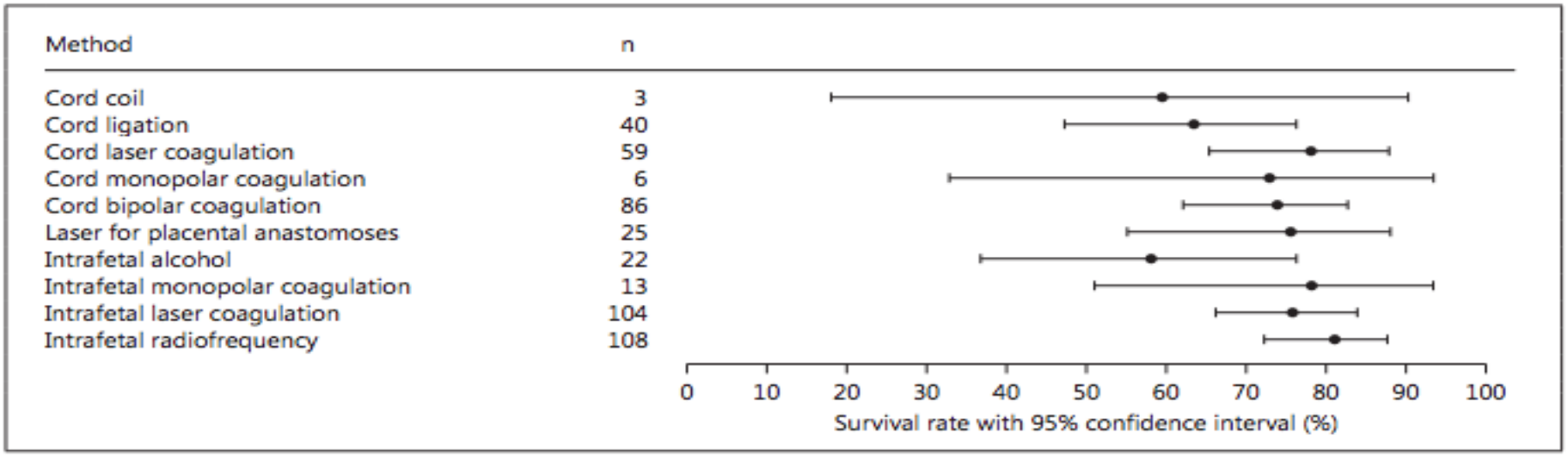


Fig. 1. Pooled estimates of survival rates across studies and heterogeneity between studies for each intrauterine intervention for TRAP sequence.

Table 6. Pooled estimates of survival rate of each method of treatment for TRAP sequence

Method	Pooled estimate, %	Heterogeneity		
		I^2 statistic	Cochrane's Q	p value
Cord coil (n = 3)	59.1 (18.5–90.2)	0.000	0.547	0.270
Cord ligation (n = 40)	63.4 (48.3–76.3)	0.000	0.599	0.080
Cord coagulation – laser (n = 59)	78.4 (65.8–87.3)	0.000	0.700	0.000
Cord coagulation – monopolar (n = 6)	72.4 (32.1–93.5)	0.000	0.472	0.178
Cord coagulation – bipolar (n = 86)	73.4 (61.8–82.5)	0.154	0.917	0.003
Placental anastomoses – laser (n = 25)	75.7 (55.1–88.7)	0.000	0.516	0.022
Intrafetal alcohol (n = 22)	58.1 (37.9–75.9)	0.000	0.590	0.228
Intrafetal MP coagulation (n = 13)	78.8 (50.6–93.1)	0.000	0.304	0.051
Intrafetal laser (n = 104)	76.0 (67.0–83.1)	0.000	0.678	0.000
Intrafetal radiofrequency (n = 108)	80.8 (72.3–87.1)	0.000	0.383	0.000

The fixed-effects model was used in all cases because the heterogeneity was low. Values in parentheses represent 95% confidence intervals. MP = Monopolar coagulation.

CERPO
Centro de Referencia Perinatal Oriente
Facultad de Medicina, Universidad de Chile

Secuencia Anemia Policitemia / TRAP

Dra. Daniela Luna S.
Dr. Daniel Martin N, Dr. Juan Guillermo Rodríguez A., Dr. Sergio de la Fuente G., Dra. Susana Aguilera P.

Julio, 2021.-