Clinical Commissioning Policy: Management of Twin to Twin Syndrome by fetoscopic laser ablation

Reference: NHS England E12/P/b

NHS England
Clinical Commissioning Policy:
Management of Twin to Twin Syndrome by fetoscopic laser ablation

First published: January 2015

Prepared by NHS England Specialised Services Clinical Reference Group for Fetal Medicine

Published by NHS England, in electronic format only

NHS England INFORMATION READER BOX		
Directorate		
Medical	Commissioning Operations	Patients and Information
Nursing	Trans. & Corp. Ops.	Commissioning Strategy
Finance		

Publications Gateway Reference:	**02678**
Document Purpose	Policy
Document Name	Management of twin to twin syndrome
Author	NHS England
Publication Date	January 2015
Target Audience	CCG Clinical Leaders, CCG Accountable Officers, Medical Directors, Directors of PH, NHS England Regional Directors, Directors of Finance, Communications Leads, NHS Trust CEs
Additional Circulation List	
Description	NHS England Management of Twin to Twin Syndrome by fetoscopic laser ablation in accordance with the criteria outlined in this document. This policy document outlines the arrangements for funding of this treatment for the population in England.
Cross Reference	N/A
Superseded Docs (if applicable)	N/A
Action Required	N/A
Timing / Deadlines (if applicable)	**N/A**
Contact Details for further information	NHS England Medical Directorate Specialised Services Skipton House, London Road SE1 6LH 0300 311 22 33 www.england.nhs.uk/commissioning/spec-services/

Document Status

This is a controlled document. Whilst this document may be printed, the electronic version posted on the intranet is the controlled copy. Any printed copies of this document are not controlled. As a controlled document, this document should not be saved onto local or network drives but should always be accessed from the intranet

Contents

Policy Statement

NHS England Management of Twin to Twin Syndrome by fetoscopic laser ablation in accordance with the criteria outlined in this document.
In creating this policy NHS England has reviewed this clinical condition and the options for its treatment. It has considered the place of this treatment in current clinical practice, whether scientific research has shown the treatment to be of benefit to patients, (including how any benefit is balanced against possible risks) and whether its use represents the best use of NHS resources.
This policy document outlines the arrangements for funding of this treatment for the population in England.

Equality Statement

Throughout the production of this document, due regard has been given to eliminate discrimination, harassment and victimisation, to advance equality of opportunity, and to foster good relations between people who share a relevant protected characteristic (as cited in under the Equality Act 2010) and those who do not share it.

Plain Language Summary

Identical twins who share a placenta (monochorionic) have blood connections inside the placenta. Twin-to-twin transfusion syndrome (TTTS) happens when there are too many blood connections in one direction, causing an unequal flow of blood between the twins.

TTTS complicates approximately 1 in 10 of all monochorionic, diamniotic twin pregnancies. Less commonly, it may also complicate some forms of triplet pregnancy. This causes the monochorionic twin pregnancy to be high risk and is potentially life threatening to the unborn babies.

Unfortunately many of the symptoms of TTTS are those of a general twin pregnancy (i.e. feeling the babies have increased growth, abdominal distension and discomfort). For this reason, from 16 weeks of pregnancy in monochorionic twins it is the recommendation that ultrasound scans are performed every two weeks. These are performed in secondary care (district hospitals) commonly within multiple pregnancy clinics covered by a range of specialties.

If the regular ultrasound scans demonstrate TTTS, (or the suspicion of TTTS) the patient will be transferred to a supra regional fetal medicine centre for assessment by a fetal medicine subspecialist with expertise in TTTS and its treatment fetoscopic laser ablation.

If this treatment is performed, the patient is likely to be transferred back to their local hospital. However, the regular ultrasound surveillance will continue at the hospital within the multi-disciplinary twin clinic.

Discussion with newborn baby specialists will take place. Even uncomplicated twins, successfully treated by fetoscopic laser ablation, will be delivered by 36 weeks of

gestation. It is possible that earlier delivery will be warranted. Such care is individualized and planned after multi-disciplinary discussion.

1. Introduction

The publication of the NICE Guidelines on the management of twins and triplets in September 2011 (1) has given comprehensive guidance on the management of twin and triplet pregnancy; and in particular emphasized the important of 'risk management' based upon the designation of chorionicity. Furthermore, the RCOG Green top guidelines on the management of monochorionic pregnancy were published in 2008. This document comprehensively discusses the detection, investigation and management of complications of monochorionic twin pregnancies (2). It discusses the organisation infrastructure for the management of such multiple pregnancies and also specific management of common complication. This Green top guideline is currently undergoing review and is being updated. The projected date of re-publication of the amended version will be October 2014 (3). Monochorionic, diamniotic twin pregnancies make up approximately 30% of all identical twin pregnancies and approximately 10% of these are complicated by twin to twin transfusion syndrome (TTTS). This is a morbid condition that if untreated leads to the fetal demise in 90% of cases, with morbidity rates in survives of greater than 50% (3, 4, 5). This is caused by the presence of unidirectional, intertwin, vascular anastomoses on the placenta causing a haemodynamic imbalance between the two twins.

For this reason, all monochorionic twins are screened by regular ultrasound scans every two weeks from 16 weeks of gestation (1,2,3). If TTTS develops then evidence indicates that before 26 completed weeks of gestation fetoscopic laser ablation is the treatment of choice leading to lower fetal loss and disability rates (4,5). The pathology may also complicate rarely monochorionic monoamniotic twin pregnancies or dichorionic and monochorionic triplet pregnancies.

The purpose of this policy is to guide the provision and practice of fetoscopic laser ablation in the management of TTTS. Its aim is to outline the best practice and commissioning responsibility in the management of pregnant women whose monochorionic twins are identified as being complicated by twin to twin transfusion syndrome. It also defines where subspecialty fetal medicine (tertiary or supra regional) services are required.

2. Definitions

1. **Before 20 weeks:** The liquor volume surrounding the 'donor' twin has a maximal pool depth (MPD) of <2cm and the 'recipient' twin has a MPD ≥8cms.
2. **After 20 weeks :** The liquor volume surrounding the 'donor' twin has a maximal pool depth (MPD) of <2cm and the 'recipient' twin has a MPD >10 cms.

The severity of the TTTS may further be defined by noting ultrasonography changes in blood flow, renal and cardiac function between the twins (6,7). This is encapsulated in the Quintero staging system (6,7). More recently others have modified this and indicated that anomalies of intertwin cardiac dysfunction may be

present even in early Quintero stage disease (8).

Amniodrainage is a procedure where, the percutaneous placement of a needle under ultrasound guidance into the amniotic sac (usually the recipient twin) is performed and a large volume of amniotic fluid (usually >1000mls) removed.

Fetoscopic laser ablation (coagulation). This is a procedure where the percutaneous placement of a fetoscope (under ultrasound guidance) into the amniotic sac (usually the recipient twin) is performed and the placental vasculature examined. An operating side port is used to introduce a laser fibre and pathological unidirectional arteriovenous are coagulated.

Fetoscopic laser ablation has been demonstrated by two Cochrane reviews to be the treatment modality of choice when treating TTTS compared to amnioreduction and septostomy.

Initially a 'non-selective' technique was used where all placental anastomoses crossing the intertwin membrane were fetoscopically ablated. This was subsequently refined to selective fetoscopic laser ablation identifying pathologic inter-twin anastomoses which are then coagulated and more recently a selective, sequential technique (lasering the arteriovenous anastomoses from the donor to the recipient first). This appears, in contemporary series, to increase the survival rate of at least one twin to 90% and that of both twins to approximately 50%.

Unfortunately, residual 'fine' anastomoses may remain present in up to 33% of cases after selective laser ablation and these increase the risks of complications such as reduced survival, recurrent TTTS and Twin Anemia Polycythemia Sequence (TAPS).

A modified fetoscopic technique, the "Solomon technique", first described by the Leiden group, coagulates a line across the vascular equator of the chorionic surface after selective ablation. This ablates any of the residual micro-anastomoses and separates the vascular territories of each twin, thereby potentially reducing complications without increasing adverse outcomes.

3. Aim and objectives

This policy aims to outline the best practice and commissioning responsibility in the management of multiple pregnancies in which TTTS has been identified.
The objectives are to:

1. Outline the care pathway for a multiple pregnancies in which TTTS has been identified.
2. To identify the subspecialty service that is required.

4. Epidemiology and needs assessment

The majority of multiple pregnancies complicated by TTTS are monochorionic diamniotic twin pregnancies (95%). Approximately 1 in 60 pregnancies are twin pregnancies in the UK and approximately 30% of these are monochorionic (9). Of these monochorionic diamniotic twin pregnancies approximately 10% develop TTTS (9,10).
The ultrasound diagnosis has been defined by the severity of TTTS has been

defined using the Quintero staging system (7).

Stage 1: discordancy in liquor volumes in twin amniotic sacs only.

Stage 2: discordancy in liquor volumes in twin amniotic sacs and no fetal bladder visualized in the donor twin.

Stage 3: discordancy in liquor volumes in twin amniotic sacs with absent end diastolic velocity in the umbilical artery of one or both twins. The recipient has pulsatile venous velocity in the umbilical vein or there is reversed flow in the Ductus Venosus during atrial contraction.

Stage 4. There is hydrops fetalis in both or one twin and /or severe fetal cardiac dysfunction.

In a series of 173 pregnancies complicated by TTTS from three centres in the USA and Australia, where treatment was either by amnioreduction or selective laser ablation, the outcome of at least one neonatal survivor was 91% (stage I), 88% (stage II), 67% (stage III) and 50% (stage IV) (43,44). Similar findings were reported from Germany in a series of 200 TTTS pregnancies treated by laser ablation: at least one neonatal survivor: 93% (stage I), 83% (stage II), 83% (stage III) and 70% (stage IV)(7).

Many reports of TTTS are difficult to interpret because of referral bias. A study from Western Australia is valuable because it is population-based, coming from the sole perinatal tertiary service in this Australian state. A prospective cohort of 71 women with TTTS was treated with amnioreduction or septostomy. There was a relationship between Quintero stage at diagnosis and mean gestational age at delivery and perinatal survival: stage I, 32 weeks of gestation, 77% survival; stage II, 31 weeks of gestation, 70%; stage III, 28 weeks of gestation, 54%; stage IV, 27 weeks of gestation, 44%. However, disease progression was often unpredictable, with 28% of pregnancies improving, 35% worsening and 37% remaining in the same grade throughout gestation. Pregnancies appeared, for example, to progress from stage I to stage III without obviously passing through stage II. Very similar findings came from a smaller cohort series in the US (n = 18). There were similar rates of regression and progression (11). Another study found a change of stage with time to be of greater prognostic significance than the stage itself and others in a research setting have found recipient cardiac diastolic function to be important in long-term prognosis (12).

Amniotic fluid discordance (but not fulfilling 8cm/2cm criteria (i.e. within the ‘normal range’) together with normal umbilical artery Doppler velocimetry is associated with good outcome (93% overall survival) and low risks of progression to severe TTTS (14%).

There is controversy about the Quintero staging of TTTS, since stage 1 disease may not necessarily be associated with the best outcome (13). To emphasize this, a cross-sectional study from a single centre in the USA has indicated that MC twin pregnancies complicated by TTTS as early as Quintero stages I and II had a significant proportion of recipient twins with ventricular hypertrophy (17/28, 61%),

atrioventricular valve regurgitation (6/28, 21%) and objective abnormalities in either right (12/24, 50%) or left (14/24, 58%) ventricular function. The suggestion that structural and/or functional assessment of the fetal heart (especially in the recipient) by echocardiography of MC pregnancies at risk of or with TTTS may be more useful in defining the risk of severe TTTS and treatment modalities such as fetoscopic laser ablation is of interest (8).

5. Evidence base

Without treatment, at least 90% of monochorionic twin pregnancies complicated by TTTS will miscarry by 26 weeks of gestation (11). For this reason interventional therapy has been advocated. The only controversy surrounds the management of stage I TTTS and a Randomised controlled trial (RCT) is presently underway evaluating immediate treatment by fetoscopic laser ablation versus conservative management (until some therapy is compelling and necessary)(14).
The Eurofetus trial randomised women with TTTS to either laser ablation or amnio-reduction. The planned sample size of 172 women aimed to demonstrate a 15% difference in survival. The trial was prematurely terminated after an interim analysis of 142 pregnancies on the advice of the trial statistician. The large majority of women had Quintero stage II or III TTTS. Three women in the laser group did not undergo the procedure. Two women in the amnio-reduction group did not undergo the procedure and seven underwent laser ablation, six following amnioreduction. Analysis was by intention to treat (15). This RCT confirmed the superiority of fetoscopic laser ablation over serial amnio-drainage in monochorionic twin pregnancies complicated by TTTS and treated by fetoscopic laser ablation (4).

Another randomised trial compared amnio-reduction with septostomy (the deliberate creation of a hole in the dividing septum with the intention of improving amniotic fluid volume in the donor sac). The trial included 73 women with TTTS (of all stages). The primary outcome was: at least one infant surviving until hospital discharge. The trial was stopped after an interim analysis because no significant differences were seen in the primary outcome (16). This is no longer considered viable therapy or management.

The results of a third study, the NICHD trial of amnio-reduction versus fetoscopic laser ablation has been added to the evidence base (5). In this RCT pregnancies with severe TTTS were only entered into the study after a ‘test’ amnio-reduction had failed. This may have produced bias in the study. This trial noted there was no statistically significant difference in 30-day postnatal survival between laser ablation or amnio-reduction treatment for donors at 55% (11 of 20) vs 55% (11 of 20) (P = 1.0, odds ratio [OR] 1, 95% confidence interval [CI] 0.242 to 4.14) or recipients at 30% (6 of 20) vs 45% (9 of 20) (P = .51, OR 1.88, 95% CI 0.44 to 8.64). There was no difference in 30 day survival of 1 or both twins on a per-pregnancy basis between amnio-reduction at 75% (15 of 20) and laser ablation at 65% (13 of 20) (P = .73, OR 1.62, 95% CI 0.34 to 8.09). Overall survival (new-borns divided by the number of fetuses treated) was not statistically significant for amnio-reduction at 60% (24 of 40) vs laser ablation 45% (18 of 40) (P = .18, OR 2.01, 95% CI 0.76 to 5.44). There was a statistically significant increase in fetal recipient mortality in the laser ablation arm at 70% (14 of 20) vs the AR arm at 35% (7 of 20) (P = .25, OR 5.31, 95% CI 1.19 to 27.6). This was offset by increased recipient neonatal mortality of 30% (6 of

20) in the amnio-reduction arm (17).

The results of both trials have been re-analysed in a Cochrane review, adjusting where possible for clustering, recognising the non-independence of twin fetuses within a pair (4,5). No significant differences were found for overall death (average RR 0.87; 95% CI 0.55 to 1.38 adjusted for clustering). Substantial heterogeneity was apparent and so a random-effects random effects analysis was performed (Heterogeneity: $Tau^2 = 0.08$; $Chi^2 = 3.13$, df = 1 (P = 0.08); $I^2 = 68\%$). It should be noted that these two trials appear to have opposite directions of effect. There has also been significant criticism of the design, entrance criteria and therapy delivered in the US study (18). However, this remains class I evidence.

For the outcome neurodevelopmental delay, more babies were alive without neurological abnormality at the age of six years in the laser group than the amnio-reduction groups (RR 1.57; 95% CI 1.05 to 2.34 adjusted for clustering). The conclusion of the Cochrane Review was that endoscopic laser coagulation of anastomotic vessels should continue to be considered in the treatment of all stages of TTTS to improve neurodevelopmental outcomes in the child (5). When compared to amnio-reduction, treatment with laser coagulation appears to result in more children being alive as children without neurological abnormality (5).

There is some evidence that fetoscopic laser ablation is the best treatment of TTTS in early (<16 weeks) and late-onset (>26 weeks) disease (19,20). Anastomoses may be missed at 'selective' fetoscopic laser ablation and TTTS can recur later in up to 14% of pregnancies or be associated with twin anaemia/polycythaemia sequence (TAPS). There is evidence that a fetoscopic laser technique of "equatorial laser dichorionization" (or the Solomon technique) significantly reduces these recurrent complications of Twin Oligohydramnios/Polyhydramnios sequence and TAPS (21). Laser ablation can be performed in mono- and dichorionic, triamniotic triplet pregnancies (22,23).

There are few data to inform how frequently ultrasound surveillance is required after fetoscopic laser ablation (or amnio-reduction). However, some experts advocate that ultrasound examination (with brain imaging, fetal measurement and Doppler assessment, especially of the middle cerebral arteries) should be performed at least weekly. TAPS may occur post-fetoscopic laser ablation in up to 13% of cases (the most common complication after fetal demise). This has led to international expert opinion citing this as routine and good practice with consideration given to delivery of the surviving twin(s) at 34-36 weeks. Often, the mode of delivery at this gestation is by caesarean section (chosen by the patient or her doctors) but care is individualised.

Maternal complications of fetoscopic laser coagulation for severe TTTS were reported in a literature review which included 40 studies, majority of which were observational studies (Merz et al 2010). The overall rate of adverse maternal events was 5.4%. In studies with systematic assessment (n=3, 379 patients) the complication rate was significantly higher (17.4% vs. 2.2%, P<0.0001). Adverse events were classified and the rate was 1.0% (1.8% vs. 0.8%, P=0.12) for severe complications; 2.9% (11.9% vs. 0.5%, P<0.0001) for intermediate/minor adverse events; and 1.5% (3.7% vs. 0.9%, P<0.0001) for complications with undetermined

relevance. The overall rate of adverse maternal events was 5.4%. In studies with systematic assessment (n=3, 379 patients) the complication rate was significantly higher (17.4% vs. 2.2%, P<0.0001). Adverse events were classified and the rate was 1.0% (1.8% vs. 0.8%, P=0.12) for severe complications; 2.9% (11.9% vs. 0.5%, P<0.0001) for intermediate/minor adverse events; and 1.5% (3.7% vs. 0.9%, P<0.0001) for complications with undetermined relevance.

Odibo et al. (2009) in a cost effectiveness analysis compared the cost-effectiveness of selective laser photocoagulation with serial amnio-drainage in the treatment of twin-to-twin transfusion syndrome using decision-analysis modeling. The analysis was carried out from a societal perspective using a theoretical cohort of 1000 women with TTTS. Costs included the costs of procedures, perinatal complications from TTTS and of resources used for raising a child with cerebral palsy following TTTS. Under the baseline assumptions, the model favors the use of SLP as the most cost-effective strategy. Selective laser photocoagulation was reported to be cost-effective compared with no treatment at all, and selective laser photocoagulation dominated serial amnio-drainage, as it was both less expensive and more effective than the serial amnio-drainage strategy. The use of selective laser photocoagulation cost $1462 per QALY, serial amnio-drainage is $2416 per QALY gained and $2790 per QALY for no treatment. It must be noted that most of the costs used for the analysis are based on US reimbursement rates.

6. Rationale behind the policy statement

All monochorionic twin, (and monochorionic & dichorionic triplet pregnancies) are at risk of TTTS and therefore it is national guidance that these pregnancies undergo regular ultrasound assessment at 2 weekly intervals from 16 weeks. This is commonly performed in secondary fetal medicine units with specialists who have ATSM training (or equivalent) in Fetal Medicine and work in multi-disciplinary multiple pregnancy clinics.

Once TTTS is diagnosed, referral to a specialist in fetal medicine will ensure, provision of multi-disciplinary care and liaison that leads to timely management of the pregnancy (fetuses) at significant risk of TTTS and optimal management of this condition.

Fetoscopic laser ablation is the treatment of choice in severe TTTS (Cochrane evidence, 2014) and is performed in a tertiary (of supra regional) fetal medicine centre with subspecialty accredited and trained individuals with experience of this form of fetal therapy.

On-going monitoring of numbers of pregnancies assessed and treated, along with and audit of outcomes must be undertaken.

7. Criteria for commissioning

Provision of multi-disciplinary care and liaison that leads to the treatment allowing timely delivery of the fetuses at significant risk from TTTS should consist of:

1. Recognizing the significance of discordant amniotic fluid volumes in multiple

pregnancies at risk of TTTS. This is ensured by multiple pregnancies being managed in multi-disciplinary multiple pregnancy clinics in secondary care centres.

2. Investigating the monochorionic twin pregnancy by serial ultrasound assessment from 16 weeks gestation to ascertain risk of TTTS and timely referral of women whose pregnancies are at risk of this condition. These pregnancies should be promptly referred to a fetal medicine centre for ultrasound assessment and assessment for treatment.

Women at high risk of TTTS are defined as those meeting the below criteria:

Using a ultrasound diagnosis

a) Before 20 weeks: The liquor volume surrounding the 'donor' twin has a maximal pool depth (MPD) of <2cm and the 'recipient' twin has a MPD >8cms

b) After 20 weeks : The liquor volume surrounding the 'donor' twin has a maximal pool depth (MPD) of <2cm and the 'recipient' twin has a MPD >10cms

The severity of the TTTS may further be defined by noting ultrasonography changes in blood flow, renal and cardiac function between the twins (6,7). This is encapsulated in the Quintero staging system (6,7).

(The above 2 stages are the responsibility of secondary care with responsibility for the provision of care transferring at point 3 to fetal medicine sub specialty services and under the commissioning remit of NHS England.)

3. **Treatment of women with high risk of TTTS** should be referred to a fetal medicine centre and offered assessment by prenatal ultrasound including intrafetal arterial, venous and cardiac Doppler assessment and where indicated, treatment with fetoscopic laser ablation delivered.

3.1 Assessment and diagnostics

Fetal ultrasound examination is performed serially from 16 weeks gestation in monochorionic twins. Monitoring is often with a multiple pregnancy clinic and in conjunction with a specialist in fetal medicine in a secondary centre and the frequency of ultrasound assessment is individually tailored to the pregnancy.

3.1.1. If the ultrasound assessment of liquor volumes remain within normal limits then monitoring should be continued at intervals up to 2 weeks, with elective delivery at 36 weeks (1,2).

3.1.2. If the amniotic fluid volumes are discordant in the monochorionic, diamniotic twin pregnancy, then referral should be made to a centre with expertise to assess and perform fetoscopic laser ablation.

3.2. Fetoscopic laser ablation

3.2.1. Monochorionic twin pregnancy complicated by severe twin to twin transfusion syndrome should be referred to a centre (often tertiary centre) with subspecialists

trained in the assessment and treatment of this complication.

3.2.2. If there is significant discordance in liquor volumes in monochorionic diamniotic twins with a reduction of liquor in one twin sac and an increase in liquor in the other sac (which does not reach the 'diagnostic criteria' for TTTS, then a minimum of weekly ultrasound assessments should be performed by specialists confident and competent to make the diagnosis of TTTS.

3.2.3. Before 26 weeks of gestation, fetoscopic laser ablation is the most appropriate treatment of severe twin-to twin transfusion syndrome.

3.2.4 Clinicians should provide parents with clear written information to ensure that parents understand that in spite of intrauterine laser ablation treatment, there is still a risk that one or both twins may not survive. A risk remains of serious abnormalities in the development of the nervous system among survivors of TTTS.

3.2.5. Clinicians should consider case selection carefully because there are uncertainties about the stages of TTTS for which this procedure is appropriate. In stage 1 TTTS, there is no international consensus as to which treatment option is best. Many practitioners perform fetoscopic laser ablation (including stage 1 pregnancies recruited for the RCT or personal, professional choice). In stage 1 TTTS the management strategy must be discussed with specialists at the tertiary referral centre for the management of TTTS.

3.2.6. The procedure should only be performed in centres specializing in invasive fetal medicine and by an appropriately constituted multidisciplinary team. A centre performing fetoscopic laser ablation should have a minimum of two practitioners with training and expertise in the technique of fetoscopic laser ablation.

3.2.7. Each centre should treat a minimum number of 15 twin pregnancies / year by fetoscopic laser ablation.

3.2.8. The technique used should be by minimal touch technique (with antibiotic prophylaxis) and appropriate sedation/analgesia of the mother.

3.2.9. The centre performing fetoscopic laser ablation for the treatment of TTTS must produce a rolling annual audit of experience (including indications for management) and outcomes (the minimum of perinatal mortality) that are combined into a three year collated report. This should be submitted to the Fetal Medicine CRG Chair and held nationally.

3.2.10. The centre must provide good communication to the referring hospital (and practitioners) that should include:

a) Timing of ultrasound follow up and advice on best practice to detect common complications such as recurrent TTTS and twin TAPS.
b) Advice on timing of delivery in those uncomplicated twins treated by fetoscopic laser ablation.

3.2.11. After 26 weeks of gestation, monochorionic twins complicated by TTTS

should be discussed with a centre (often tertiary centre) and subspecialists trained in the assessment and treatment of this complication. This ideally should involve multi-disciplinary discussion including a neonatal paediatrican. Treatment options should be discussed and the reasons for the choice documented. In addition outcomes of these pregnancies must be submitted in a rolling annual audit of experience (including indications) and outcomes that are combined into three year collated and nationally submitted figures to allow for big year to year variations.

3.3 Termination of pregnancy

Some women may request termination of pregnancy when severe TTTS is diagnosed and this should be discussed as an option. Another option is to offer selective termination of pregnancy using bipolar diathermy of one of the umbilical cords or using radiointerstitial thermal ablation (RITA); with inevitable sacrifice of that baby. This may be appropriate if there is severe growth discordance with the donor twin severely growth restricted, hydrops fetalis in the recipient or evidence of cerebral damage in either twin (24,25).

8. Patient pathway

The service specification for fetal medicine services describes the detail of the care pathways and the key aspects of services being commissioned and should be referred to in conjunction with this policy.

The tertiary, fetal medicine subspecialty service will accept referrals in a timely manner from consultant medical staff and the appropriate specialist from secondary care.

Women with monochorionic twins at high risk of TTTS should be referred to a fetal medicine sub-specialty centre and will be offered assessment by prenatal ultrasound including intra-fetal arterial, venous and cardiac Doppler insonation and where indicated, treatment by fetoscopic laser ablation offered.
Fetal ultrasound examination of monochorionic diamniotic twins should be performed serially from 16 weeks gestation (1, 2, 3). Monitoring is often performed within multi-disciplinary, multiple pregnancy clinics led by specialists in fetal medicine in a secondary centre.

9. Governance arrangements

The service specification for fetal medicine describes the care pathways and key aspects of fetal medicine services being commissioned and should be referred to in conjunction with this policy.

10. Mechanism for funding

All fetal medicine is currently funded through the Maternity Pathways Payment and subspecialty services should invoice the booking hospital for these treatments within the fetal episode of care.

The neonatal on going management will be picked up within the current neonatal critical care funding.

11. Audit requirements

The centre performing fetoscopic laser ablation for the treatment of TTTS must produce a rolling annual audit of experience (including indications for management) and outcomes (the minimum of perinatal mortality) that are combined into a three year collated report. This should be submitted to the Fetal Medicine CRG Chair and held nationally.
Data and information should also be submitted as detailed in contracts to the fetal medicine dashboard.

12. Documents which have informed this policy

See reference list below.

13. Links to other policies

This policy follows the principles set out in the ethical framework that govern the commissioning of NHS healthcare and those policies dealing with the approach to experimental treatments and processes for the management of individual funding requests (IFR).

14. Date of review

This policy will be reviewed in 2017 unless information is received which indicates that the proposed review date should be brought forward or delayed.

References

1. Multiple Pregnancy. The management of twin and triplet pregnancies in the antenatal period. NICE Clinical Guideline 129; 2011.

2. Monochorionic Twin Pregnancy, Management (Royal College of Obstetrician and Gynaecologists Green-top 51). http://www.rcog.org.uk/womens-health/clinical-guidance/management-monochorionic-twin-pregnancy.2008.

3. Monochorionic Twin Pregnancy, Management (update of Royal College of Obstetrician and Gynaecologists Green-top guideline 51). For publication in October 2014.

4. Roberts D, Gates S, Kilby M, Neilson JP. Interventions for twin-twin transfusion syndrome: a Cochrane review. Ultrasound Obstet Gynecol. 2008;31(6):701-11

5. Roberts D, Neilson JP, Kilby MD, Gates S. Interventions for the treatment of twin-twin transfusion syndrome. Cochrane Database Syst Rev. 2014;1:CD002073.

6. Quintero RA, Morales WJ, Allen MH, Bornick PW, Johnson PK, Kruger M. Staging of twin-twin transfusion syndrome. J Perinatol 1999;19:550–5.

7. Quintero RAM et al. Stage-based treatment of twin-twin transfusion syndrome. Am J Obstet Gynecol 2003;188:1333–40.

8. Raboisson MJ, Fouron JC, Lamoureux J, Leduc L, Grignon A, Proulx F, et al. Early intertwin differences in myocardial performance during the twin-to-twin transfusion syndrome. Circulation 2004;110:3043–8.

9. Visintin C, Mugglestone MA, James D, Kilby MD; Guideline Development Group. Antenatal care for twin and triplet pregnancies: summary of NICE guidance. BMJ. 2011;343:d5714. doi: 10.1136/bmj.d5714.

10. Lewi L, Gucciardo L, Van Mieghem T, de Koninck P, Beck V, Medek H, Van Schoubroeck D, Devlieger R, De Catte L, Deprest J. Monochorionic diamniotic twin pregnancies: natural history and risk stratification. Fetal Diagn Ther. 2010;27(3):121-33. doi: 10.1159/000313300.

11. Dickinson JE, Evans SF, Dickinson JE, Evans SF. The progression of disease stage in twin–twin transfusion syndrome. J Matern Fetal Neonatal Med 2004;16:95–101.

12. Taylor MJ, Govender L, Jolly M, Wee L, Fisk NM. Validation of the Quintero staging system for twin–twin transfusion syndrome. Obstet Gynecol 2002;100:1257–65.

13. Ville Y. Twin-to-twin transfusion syndrome: time to forget the Quintero staging system? Ultrasound Obstet Gynecol 2007;30:924–7.

14. Randomized Controlled Trial Comparing a Conservative Management and Laser Surgery (TTTS1). http://clinicaltrials.gov/show/NCT01220011.

15. Senat MV, Deprest J, Boulvain M, Paupe A, Winer N, Ville Y. Endoscopic laser surgery versus serial amnioreduction for severe twin-to-twin transfusion syndrome. N Engl J Med 2006;8:136–44.

16. Moise KJJ. A randomized trial of amnioreduction versus septostomy in the treatment of twin-twin transfusion syndrome. Am J Obstet Gynecol 2005;193:701–7.

17. Crombleholme TM, Shera D, Lee H, D'Alton M, Porter F, Chyu J, J et al. A prospective randomized multicenter trial of amnioreduction vs. selective fetoscopic laser photocoagulation for the treatment of severe twin-twin transfusion syndrome. American Journal of Obstetrics and Gynecology 2007;197(4 4):396.e1-396.e9396.e1-e9.

18. Moise KJ Jr, Bebbington MW, Johnson A, Walker M, Johnson M. The benefit of laser therapy for severe twin-twin transfusion: which meta-analysis do you pick? Am J Obstet Gynecol. 2013;209(2):158-9. doi: 10.1016/j.ajog.2013.03.020

19. Baud D, Windrim R, Keunen J, Kelly EN, Shah P, van Mieghem T, Seaward PG, Ryan G. Fetoscopic laser therapy for twin-twin transfusion syndrome before 17 and after 26 weeks' gestation. Am J Obstet Gynecol. 2013;208(3):197.e1-7.

20. Middeldorp JM, Lopriore E, Sueters M, Klumper FJ, Kanhai HH, Vandenbussche FP, Oepkes D. Twin-to-twin transfusion syndrome after 26 weeks of gestation: is there a role for fetoscopic laser surgery? BJOG. 2007;114(6):694-8.

21. Slaghekke F, Lopriore E, Lewi L, Middeldorp JM, van Zwet EW, Weingertner AS, Klumper FJ, Dekoninck P, Devlieger R, Kilby MD, Rustico MA, Deprest J, Favre R, Oepkes D. Fetoscopic laser coagulation of the vascular equator versus selective coagulation for twin-to-twin transfusion syndrome: an open-label randomised controlled trial. Lancet. 2014 Mar 6. pii: S0140-6736(13)62419-8. doi: 10.1016/S0140-6736(13)62419-8.

22. Van Schoubroeck D, Lewi L, Ryan G, Carreras E, Jani J, Higueras T, et al. Fetoscopic surgery in triplet pregnancies: a multicenter case series. Am J Obstet Gynecol 2004;191:1529–32.

23. Sepulveda W, Surerus E, Vandecruys H, Nicolaides KH. Fetofetal transfusion syndrome in triplet pregnancies: outcome after endoscopic laser surgery. Am J Obstet Gynecol. 2005;192(1):161-4.

24. Taylor MJ, Shalev E, Tanawattanacharoen S, Jolly M, Kumar S, Weiner E, et al. Ultrasound-guided umbilical cord occlusion using bipolar diathermy for Stage III/IV twin-twin transfusion syndrome. Prenat Diagn 2002;22:70–6.

25. Paramasivam G, Wimalasundera R, Wiechec M, Zhang E, Saeed F, Kumar S. Radiofrequency ablation for selective reduction in complex monochorionic pregnancies. BJOG. 2010;117(10):1294-8.

26. Odibo AO, Caughey AB, Grobman W, Stamilio DM, Ville Y. Selective laser photocoagulation versus serial amniodrainage for the treatment of twin-twin transfusion syndrome: a cost-effectiveness analysis. J Perinatol. 2009 Aug;29(8):543-7.

27. 27.Merz W, Tchatcheva K, Gembruch U, Kohl T. Maternal complications of fetoscopic laser photocoagulation (FLP) for treatment of twin-twin transfusion syndrome (TTTS).J Perinat Med. 2010 Jul;38(4):439-43