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Outcome of Amnioreduction in the Management of Polyhydramnios at Lala Ded Hospital a Tertiary Care Hospital of North India

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ABSTRACT

Background: The purpose of this study was to evaluate the contribution of Amnioreduction to the management of pregnancies that are complicated by symptomatic polyhydramnios. Study Design: Retrospective review of all s pregnancies that received at least one. **Methods:** Amnioreduction for polyhydramnios from 2017-2018 at a Lala Ded hospital that provides a statewide service. The indications, procedural techniques, and pregnancy outcomes were evaluated. **Results:** Twenty-eight women with polyhydramnios (maximal vertical pocket [MVP], >8 cm) had 61 Amnioreduction procedures during the study period. The median gestation at the first drain was 31.4 weeks (interquartile range, 28.4-34 weeks) and a median of 1 procedure (interquartile range, 1-2 procedures) was performed per pregnancy. Sixteen women (57.1%) required >1 Amnioreduction. The median volume removed per pregnancy was 1200 mL (interquartile range, 650-1860 mL). The median duration from the first Amnioreduction until delivery was 26 days (interquartile range, 15-52.5 days). There was no significant association between gestation at delivery and the volume per procedure or total volume that was removed. Earlier gestation at first drain was associated positively with earlier gestations at delivery. In 10.5% of Amnioreduction procedures (3/28 procedures), there was an unplanned preterm birth within 48 hours. The median gestation at delivery was 36.4 weeks (interquartile range, 34-38 weeks). The final diagnoses were gastrointestinal malformations (17.9%), idiopathic polyhydramnios (50%), chromosomal anomaly (10.7%), syndromic condition (14.3%), and neurologic condition (7.1%). **Conclusion:** Amnioreduction has a useful role in the management of polyhydramnios in pregnancies. Complications are uncommon, and delivery typically occurs near term.

Keywords: Amnioreduction, fetus, polyhydramnios, pregnancy.

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INTRODUCTION

Polyhydramnios, the presence of excessive amniotic fluid volume, has a reported prevalence of 1-2%.[1] It has been defined variously, typically based on ultrasound criteria, as an amniotic fluid index >25 cm,[2] maximal vertical pocket >8 cm,[3] or the visual assessment of increased amniotic fluid volume by a sonographer.[4] The severity of polyhydramnios varies, and there are several sub classifications based on either amniotic fluid index or maximal vertical pocket (MVP) to reflect this variance.[1] There is a recognized association of polyhydramnios and adverse pregnancy outcomes that include perinatal death, fetal abnormality, and preterm birth.[1,5,6] Polyhydramnios reflects a final common pathway of several obstetric events such as fetal abnormalities, placental tumors, maternal diabetes mellitus, and fetal anemia. However, in 40-50% of cases no cause is evident prenatally, and the polyhydramnios is classified as idiopathic; however, in approximately 10% of cases, an abnormity is identified after delivery.[7] Once a diagnosis of polyhydramnios is made and investigations for potential causes are performed, the subsequent management of the pregnancy can be problematic, particularly in severe cases, because of issues that surround maternal discomfort and the risk of preterm birth. Amnioreduction, widely used in the management of twin- twin transfusion syndrome (TTTS) in monochorionic twin pregnancies before the introduction of placental laser ablation, is an option that is available to palliate maternal symptoms and that potentially can prolong the pregnancy. Although there is a large volume of literature available on amnioreduction in TTTS,[8-11] there are much fewer data published on amnioreduction in singleton pregnancies.[12] A recent metaanalysis to evaluate the complications of amnioreduction in singleton pregnancies could identify only 4 small cases series over a 20-year period.[12] Given the paucity of data

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available on a procedure that anecdotally appears to be offered by most fetal medicine units, we retrospectively reviewed all cases of amnioreduction that were performed in singleton pregnancies in our institution during the 13-year period of2000-2012. The aim of our study was to review the indications, procedural complications, and outcomes of singleton pregnancies that were complicate d by poly-hydramnios of a severity warranting amnioreduction.

MATERIALS & METHODS

This was a retrospective review of women who were referred to laladed Hospital form whole of Kashmir division, with polyhydramnios that complicated pregnancy that underwent at least 1 amnioreduction procedure between January 2016 and December 2017. Cases were identified from interrogation of the ultrasound department Radiology Information. All identified cases were then reviewed with the use of the maternal and child medical record chart, with regard to the maternal and fetal characteristics, pregnancy outcome, and, for survivors, the short-term outcomes. Our hospital is the sole tertiary referral center for Kashmir division of Jammu and Kashmir, and amnioreduction is performed at our center only. Therefore, this case series represents the experience of our entire state obstetric population over a 1-year period, during which approximately 335,000 singleton births at >20 weeks' gestation occurred.[13] The investigational protocol was approved by the Institutional Ethics Committee before commencement of the study. Our institutional protocol for the assessment of pregnancies that are complicated by polyhydramnios involves a detailed ultrasound assessment of the fetus and placenta, plus screening for red cell antibodies, diabetes mellitus, and infection. Amniocentesis is performed if the preceding investigations are suggestive of a chromosomal anomaly, infection, or other condition in which amniotic fluid analysis maybe diagnostic (eg, cystic fibrosis, skeletal dysplasia). Amnioreduction was performed in women who were symptomatic from the excess amniotic fluid (eg, maternal abdominal pain, dyspnea) and with a MVP of >8 cm at the initial ultrasound scanning for whom the attending fetal medicine specialist believed that the procedure would benefit the pregnancy management. The decision for amnio- reduction was made on a case-by-case basis.

Amnioreduction was not performed in women with a coagulation disorder and a maternal infection with the potential for perinatal transmission such as HIV and who were in active labor or for whom delivery was considered inevitable in the short-term. The amniotic fluid was sent for fetal karyotyping in all cases if this had not been performed previously and for microbiologic studies when there was potential for a congenital infection. The technique that was used for amnioreduction was uniform during the study period. All women received a premedication of intramuscular morphine and promethazine approximately 30 minutes before the amniotic fluid aspiration was conducted. After maternal positioning and identification, by ultrasound scanning, of the most suitable site for the drain, an 18-gauge spinal needle was inserted trans- abdominally under continuous ultrasound guidance. Trans placental needle insertion was avoided. The amnioreduction was performed under continuous ultrasound guidance to minimize fetal contact and to permit continuous aspiration as the uterine size altered with the reduction in volume. Amniotic fluid was removed at a rate of 100-125 mL/minute. The volume of amniotic fluid removed was dependent on the operator and the clinical situation (eg, maternal uterine activity, fetal position), but in general was restricted to no >800-1500 mL per procedure. Data were collected and collated for all women on maternal characteristics, ultrasound findings, cause of polyhydramnios when known, procedural information that included complications, and pregnancy outcome that included the final perinatal diagnosis. Data on the surviving children were obtained through the medical record charts of the sole tertiary care hospital in our state. Numeric variables are presented as median (interquartile range [IQR]) and categoric data are presented as a number (percentage). Linear regression was used to assess the relationship between total fluid volume removed and gestation at delivery outcomes with gestation at the initial amnioreduction procedure. Total fluid volume was log transformed for analysis to achieve normality of residuals. Statistical analysis was performed using IBM SPSS Statistics for Windows.

RESULTS

During the study period 28 women with symptomatic polyhydramnios that complicated a pregnancy underwent 61 amnioreduction procedures at our institution. The maternal and pregnancy characteristics are presented in [Table 1]. The median gestation at the time of the first Amnioreduction was 31.4 weeks (IQR, 28.4—34 weeks ;). Most women received more than one amnioreduction, although there was a wide range of procedural numbers and 16 of the women (57.1%) required >1 amnioreduction [Table 1]. The median volume of amniotic fluid removed per procedure was 600 mL (IQR, 400—1250 mL); the median volume drained per pregnancy was 1200 mL (range, 500—17,500 mL) and the median MVP at the conclusion of the amnioreduction was 5.8 cm (IQR, 4.8—6.8 cm). Delivery occurred at a median of 36.4 weeks' gestation (range, 23.2—41.2 weeks) with a median prolongation of the pregnancy from the time of the first drain until birth of 3.7 weeks (range, 0—16.1 weeks) [Table 1].

Table 1: Maternal and fetal characteristics (n = 138)

S.no	Variable	Measure
1	Maternal age	32 (27- 35.5)
2	Parity	1 (1-2)
3	Gestation at first amnioreduction wk	31.4(28.4-34)
4	Median amnioreduction per pregnancy	1(1-2)
5	Gestation at delivery (week)	36.4(23.2-41.2)
6	Volume removed per pregnancy	600(400-1250)
7	Caesarean delivery	17(60.7%)
8	Drain delivery interval	3.7(2.1-7.5)

Fetal anomalies were the predominant reason for the severe polyhydramnios and varied from structural to functional abnormalities. Fetal anomalies were responsible for 50% of the cases (14/28) and gastrointestinal obstructive lesions were numerically [17.9] the most frequent indication for amniotic fluid drainage, idiopathic polyhydramnios (50%), chromosomal anomaly (10.7%), syndromic condition (14.3%), and neurologic condition (7.1%).Complications after amnioreduction are presented in [Table 2].

Table 2: Amnioreduction Outcome

S.no	Amnioreduction Outcome	Number (n)	Percentage (%)
1	Preterm premature rupture of membranes <48 hr after drain	1	3.5(%)
2	Delivery <48 hr after drain	3	10.7(%)
3	Abruption	1	3.5(%)
4	Bradycardia that required delivery	0	0
5	Fetal death <24hr after drain	0	0
6	Chorioamnities	2	7.1

The most common complications were preterm birth within 48 hours of an amnio- reduction (10.5% of all procedures) or preterm prelabor rupture of membranes (7.0% of all procedures). The fetus had a known lethal anomaly in 5 of the 11 cases that delivered within 48 hours of an amnioreduction. Cervical length before amnioreduction was not measured routinely. There was no significant association between the gestation at first amnioreduction and the total volume removed (P = .592). Gestation at the first amnioreduction was associated positively with later gestation at delivery but at a reducing rate as gestation approached term. We did not have the capacity to assess long-term morbidity of survivors in this study.

DISCUSSION

This series of amnioreduction procedures in pregnancies that were complicated by symptomatic polyhydramnios has demonstrated 3 main features. First, there is a strong association of excessive amniotic fluid volume and adverse fetal outcomes. Most fetuses with polyhydramnios in our series had a significant structural or functional problem, and 1 in 3 died either perinatally or within the first year of life. Second, there is an apparent effectiveness of large-volume amnioreduction in prolonging gestation which is similar to that observed with amnioreduction in TTTS.[11] Delivery in our cohort occurred at a median of 36 weeks' gestation, which is likely to be particularly beneficial for those fetuses who require neonatal surgery. Third, the complication rate from large-volume amnio-reduction was not high, especially when considering the high risk of preterm birth that typically is associated with severe polyhydramnios.[12] Amnioreduction, the removal of large volumes of amniotic fluid, has long been used as a component in the management of severe polyhydramnios and is offered by most fetal medicine units. The technique has undergone progressive procedural modifications over the past 3 decades, from 1 of passive gravitational drainage through to a syringe manual aspiration technique with a 3-way tap until the current process of continuous aspiration with an electronic vacuum device. Passive gravitational drainage is a slow technique that typically does not permit the removal of large volumes of amniotic fluid and was replaced in the early 1990s in our unit by a syringe technique with a 3-way tap and manual aspiration with a 50-mL syringe. The syringe technique also does not allow rapid removal of amniotic fluid and results in significant discomfort for the operator because of the repetitive aspiration movements that are required. In the mid and late 1990s, reports appeared of the use of vacuum bottle aspiration systems for the removal of large volumes of amniotic fluid in women with poly-hydramnios.[15,16] Despite some initial concerns that the rapid removal of large volumes of amniotic fluid may result in placental abruption, preterm labor, or membrane rupture,[12,17] this does not appear to be a frequent occurrence. In our series of 271 large-volume amnio- reduction procedures (with volume removal rates of 100-125 mL/min), the occurrence of preterm birth within 48 hours of the procedure was 4.1%, and the occurrence of premature rupture of membranes was 1.1%. Procedural complication rates recently have been reported in a systematic review of4 case series of amnioreduction procedures in singleton pregnancies.[12] Delivery within 48 hours of the procedure occurred in 1 of 47 cases (2.1%), with other outcomes difficult to quantify because of small case numbers. Given that these pregnancies are at increased risk for preterm birth and membrane rupture, it is unclear as to the precise contribution of the drainage procedure to these outcomes. We did not have access to robust data on maternal symptoms after the amnio- reduction procedure, although anecdotally symptom relief was the typical maternal response. Interestingly, there are few published series on amnioreduction in singleton pregnancies; to date, all of them have been characterized by small case numbers or combined with data from multiple

pregnancies that were complicated by TTTS, where the pathophysiologic condition is quite different.[15,17,18] In the last decade, 2 small series and 1 systematic review on amnioreduction that involved singleton pregnancies have been published.[12,17,18] Leung et al,[17] reported on 70 women who received 130 amnioreduction procedures with the use of a vacuum wound-drainage system in 2004. Within this data set were 33 women with TTTS (80/130 procedures) and 4 women with a dichorionic twin pregnancy. Thus, there were 33 women with a singleton pregnancy (47%) in the study population who received 45 drainage procedures. The mean gestation at initial drain was 31 weeks in the non-TTTS cohort, which is very similar to that in our study, and most pregnancies were complicated by fetal anomalies. There was 1 procedure-related complication in the singleton cohort that occurred at 32 weeks gestation in a woman with unexplained polyhydramnios with premature rupture of membranes within 48 hours of a 600-mL drain. In a small case series of 10 singleton pregnancies that required at least 1 amnioreduction for polyhydramnios (15 procedures in total), Piantelli et al18 reported a pregnancy prolongation of 18 days (range, 0—42 days) with a median gestation at first procedure of 30 weeks and a delivery median of 32 weeks. There was a highly successful reduction in maternal symptoms in this cohort (100% resolution of dyspnea). Two women delivered after the first drainage procedure, and there was 1 placental abruption that resulted in a neonatal death. In 2013, a systematic review reported on 4 studies that were published between 1994 and 2004 and incorporated a total of 100 women.[12] The authors were not able to quantify individual procedural complication rates because of small numbers and failure to report all complications by all authors. The addition of our series to the obstetric literature increases the objective knowledge base of the outcomes for singleton pregnancies that are complicated by polyhydramnios severe enough to warrant amnioreduction. Most fetuses in this cohort had a pre- or postnatally recognizable problem that would reasonably account for the severe polyhydramnios. It has been previously shown that the more severe the polyhydramnios the higher the likelihood of a fetal anomaly. In the cases that appeared to be truly isolated at the time of neonatal discharge, 2 of 22 cases (9.1%) were diagnosed subsequently with cerebral palsy in childhood. Clearly, for women with symptomatic polyhydramnios, the likelihood of a fetal problem is high, and the chance of that problem being associated with a complicated outcome is similarly high, but not universal. While the outcome of the pregnancy was fundamentally a consequence of the primary fetal diagnosis, the prolongation of the pregnancy in those cases that required early neonatal surgery (predominantly gastrointestinal anomalies such as duodenal atresia) is likely to be beneficial in terms of anesthesia risk and postoperative care. The strength of this study lies in the size of the study cohort, its state-wide population base, and the uniform amnioreduction protocol that is used. This was a retrospective study and thus has some obvious weaknesses, which include the absence of robust data on maternal symptoms before and after the amnioreduction procedures, variability in the amount of amniotic fluid removed per procedure, the absence of accurate information on the duration of each procedure, the deficiency of data on cervical length, and the lack of a control group. There were several medical practitioners in our unit who performed the amnioreduction procedures, both maternal fetal medicine specialists and fellows in training. We do not see this as a study weakness necessarily; indeed this practitioner variability increases the generalizability of the study to all units with the facility for amnioreduction and can reassure units that a low complication rate typically accompanies large- volume drainage of amniotic fluid in polyhydramnios. We conclude that large-volume amnioreduction for symptomatic polyhydramnios in singleton pregnancies has a role in contemporary fetal medicine practice. The use of vacuum- assisted aspiration devices facilitates the rapid removal of large volumes of amniotic fluid with low complication rates and may prolong gestation, which could be advantageous for situations in which neonatal surgical intervention is required. There is a need for ongoing research in the clinical management of severe polyhydramnios to assess the role of medical therapies compared with amnioreduction, the predictive role of cervical length in polyhydramnios and its influence on latency from drainage until delivery, and a better definition of the capacity of amnioreduction to prolong pregnancy.

CONCLUSION

Amnioreduction has a useful role in the management of polyhydramnios in pregnancies. Complications are uncommon, and delivery typically occurs near term.

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