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Amnioreduction in cases of polyhydramnios: Indications and outcomes in singleton pregnancies without fetal interventions

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ABSTRACT

Objective: To evaluate indications, pregnancy outcomes, and risk of adverse events following amnioreduction procedures in singleton gestations.
Study design: Study of all amnioreduction procedures performed on singleton gestations complicated by polyhydramnios between January 2011 and June 2018 at our tertiary and regional referral fetal center. Clinical indications for amnioreduction procedures were categorized as either maternal shortness of breath, perceived abdominal tightness, or preterm uterine contractions with or without cervical change. Our primary outcome(s) of interest were: preterm premature rupture of membranes (PPROM), placental abruption, chorioamnionitis and/or preterm delivery, each in isolation or as a composite.
Results: Among 358 patients who underwent amnioreduction in the study period, 251 arose from cases of twin-twin transfusion syndrome (TTTS) and 74 were singletons undergoing additional fetal intervention procedures. Each of the remaining 33 patients underwent a median number of one [range 1–12] amnioreductions over the antepartum interval, yielding a total of 66 amnioreduction procedures. Among the study cohort, there were no instances of PPROM, placental abruption, chorioamnionitis or preterm delivery within the 12 h following the procedure but 10.6% experienced preterm delivery within 48 h of amnioreduction.
Conclusion: Our data suggests that among singleton gestations, there was a low risk for preterm delivery in close proximity to the procedure and none experienced rupture of membranes, placental abruption, sepsis, fetal demise or neonatal death. This data may be used in counseling of potential candidates for amnioreduction with singleton pregnancies and symptomatic polyhydramnios.

Introduction

Polyhydramnios is estimated to be present in 1–2% of all pregnancies [1]. Some adverse pregnancy outcomes such as preterm premature rupture of membranes (PPROM) and preterm birth have been shown to be associated with polyhydramnios [1–3]. Polyhydramnios can be caused by conditions such as gestational diabetes mellitus, placental tumors, fetal anemia and fetal anomalies. However, in 40–50% of the cases, it is classified as idiopathic [4]. To alleviate maternal symptoms and prolong the duration of pregnancies with polyhydramnios, amnioreduction has been proposed as an acceptable intervention [5–8] Previous publications have shown a reduction in the risk for premature rupture of membranes and preterm labor decrease, placental perfusion improvement, and relief of maternal discomfort following amnioreduction [9]. The frequency of complications related to amnioreduction has been a matter of debate [5,10]. In fact, most available literature pertaining to this subject is based on TTTS subjects. There is a paucity of data on the role and safety of amnioreduction in singleton pregnancies. We sought to evaluate indications, pregnancy outcomes, and risk of adverse events following amnioreduction in women with singleton pregnancies.

Materials and methods

This was a descriptive study of amnioreduction procedures performed on singleton gestations complicated by polyhydramnios

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between January 2011 and June 2018 at Texas Children's Hospital in Houston, Texas (approved by institutional review board at Baylor College of Medicine [H-37494]). In our center, all amnioreductions were performed using a uniform technique. The technique consists of using appropriate antisepsis, placing a sterile field, local analgesia, ultrasound-guided introduction of a 22-20-gauge needle (15-cm-length Echotic disposable) through the amniotic sac, and aspiration of amniotic fluid with assistance of vacuum bottle. Cefazolin was administered to all subjects prior the procedure.

We recorded data of all amnioreduction procedures regarding maternal characteristics including maternal age, ethnicity and race, gravidity, parity, estimated gestational age (EGA), and also adverse pregnancy outcomes. Clinical indications for amnioreduction procedures were preterm uterine contractions, abdominal discomfort, and/or shortness of breath. Outcome variables that were collected included rates of PPROM, placental abruption, chorioamnionitis and preterm delivery, in isolation or combined, which were recorded within 12 h of the procedure and also within 48 h of the procedure. The study was approved by the institutional review board at Baylor College of Medicine (H-37494).

Data were tested for normality using the Kolmogorov-Smirnov Test and reported as mean ± SD, median [range] and n (%).We used the number of procedures as the denominator for calculating the rates for outcomes since the complications are believed to be correlated to the procedures and multiple patients had multiple amnioreductions during the same pregnancy. Because all patients with polyhydramnios and clinical symptoms are offered amnioreduction at our institution, no appropriately comparable subject cohort was available for comparative analysis.

Results

Among 358 patients who underwent amnioreduction in the study period, 251 were cases of twin-twin transfusion syndrome, and 74 were singletons who underwent additional forms of fetal interventions; these cases were excluded from further study. The remaining n = 33 comprised our further nested study group, as they were singletons who underwent amnioreduction without additional fetal intervention procedures and were not complicated by TTTS. Patients in the study group underwent a median number of one [range 1–12] amnioreductions over their entire gestation. Most women (19/33) underwent 1 amnioreduction and the remaining (14/33) received >1 amnioreduction. Table 1 shows the characteristics of the study participants. Average gestational age at delivery and the median number of procedures were 36 weeks (30–40). and one [1–12], respectively (Table 1). There were a total of 66 amnioreduction procedures associated with the 33 subjects of the study (Table 2). Table 2 depicts the indication for amnioreduction per procedure. The median amount of fluid removed was 1700 [400, 3500]. The procedure was successful in all cases. Among the study cohort, there were no instances of PPROM, placental abruption, chorioamnionitis, maternal bleeding, preterm delivery, chorioamniotic separation and fetal bradycardia within 12 h following the procedure. However, in 7/66 (10.6%) of amnioreductions, preterm delivery occurred 12–48 hours post procedure. The cases necessitating delivery at 12–48 hours included 2 cases of active preterm labor, 2 cases of sacrococcygeal teratoma with hydrops with a non-reassuring fetal heart tracing, 1 case of preeclampsia with severe features, and 2 cases of fetal hydrops with mirror syndrome which were diagnosed after the procedure.

Discussion

Our study supports the hypothesis that amnioreduction in singleton pregnancies is a safe procedure; no complications including preterm birth, PPROM, placental abruption and chorioamniotitis were seen within 12 h after the procedure and 10.6% experienced preterm birth within 48 h of the procedure.

Table 3 shows the clinical outcomes following amnioreduction in singleton pregnancies on the basis of results of the present study and earlier work done by Elliott et al. (1994), Leung et al. (2004), Piantelli et al. (2004), Stojic et al. (2004), Dickinson et al. (2014) and Kleine et al. (2016) [5,11–15]. In 2013, Thompson et al. published a systematic review of four studies on amnioreduction in singleton pregnancies [10]. However, the precise assessment of adverse events following the procedure was not possible, because of the small number of cases and lack of availability of all adverse outcomes.

Amnioreduction is an effective tool to reduce signs and symptoms of severe polyhydramnios. In the last three decades, this procedure has been offered to pregnant women with excessive amniotic fluid. The majority of the studies on amnioreduction include pregnancies complicated with TTTS [11–13]. Only a few studies have focused on singleton pregnancies complicated by polyhydramnios and associated adverse outcomes [5,10,14]. Our data suggests minimal

Table 1
Descriptive statistics of the study subjects.

Variables	N = 33
Maternal Age, year	30.0 ± 6.5
Race/ Ethnicity	
Non-Hispanic Black	3 (8.8)
Non-Hispanic White	19 (55.9)
Hispanic	8 (23.5)
Others	4 (11.8)
Gravidity	2 [1,8]
Parity	1 [0,4]
Etiology	
Neck Mass	8 (24.2)
Lung Mass	4 (12.1)
NIH	3 (1.0)
SCT	3 (1.0)
Idiopathic	5 (1.5)
Others	10 (30.3)
Number of Amnioreduction	1 [1,12]
EGA at Delivery, week	36 [30, 40]

NIH = non-immune hydrops; SCT = sacrococcygeal teratoma; EGA = estimated gestational age.
Variables are presented as mean ± SD, median [range] and n (%).

Table 2
Characteristics and outcomes of amnioreduction per procedure.

Variables	N = 66 procedures
EGA at amnioreduction, week	32 [25, 38]
AFI before amnioreduction	37 [25, 60]
AFI after amnioreduction	25 [14, 43]
Amount of fluid removed, cc	1700 [400, 3500]
Indication for amnioreduction	
Shortness of breath	44 (66.7)
Abdominal discomfort	13 (19.7)
Preterm contractions	26 (36.4)
Complications within 12 hrs of procedure	
PPROM	0 (0)
Placental Abruption	0 (0)
Chorioamnionitis	0 (0)
Preterm Delivery	0 (0)
Complications within 48 hr of procedure	
PPROM	0 (0)
Placental Abruption	0 (0)
Chorioamnionitis	0 (0)
Preterm Delivery	7 (10.6)

EGA = estimated gestational age; AFI = amniotic fluid index; PPROM = preterm premature rupture of membranes.
Variables are presented as mean ± SD, median [range] and n (%).

Table 3
Review of literature on clinical outcome following amnioreduction procedures in singleton pregnancies.

Study	N	Preterm Labor	Fetal Demise	Neonatal Death	Sepsis/ CAM	Placental Abruption	ROM After Procedure	Delivery After Procedure	
		n/N(%)	n/N(%)	n/N(%)	n/N(%)	n/N(%)	<48 h n/N(%)	<12h n/N(%)	<48 h n/N(%)
Elliott et al. (1994)	53	–	–	–	–	1/53 (1.8)	–	–	–
Leung et al. (2004)	29	–	–	–	0/29 (0)	0/29 (0)	1/29 (3.4)	–	0/29 (0)
Piantelli et al. (2004)	10	2/10 (20)	–	2/10 (20)	–	1/10 (10)	–	–	0/10 (0)
Stojic et al. (2004)	8	6/8 (75)	0/8 (0)	1/8 (12.5)	–	1/8 (12.5)	–	–	1.8 (12.5)
Dickinson et al. (2014)	138	–	1/138 (0.7)	20/138 (14.5)	0/138 (0)	0/138 (0)	3/138 (2.1)	–	11/138 (7.9)
Kleine et al. (2016)	44	18/44 (51.4)	0/44 (0)	–	0/44 (0)	1/44 (2.3)	1/44 (2.2)	–	5/44 (11)
Present study	33	22/33 (66.6)	–	–	0/33 (0)	0/33 (0)	0/33 (0)	0/33 (0)	7/33 (21)

CAM = chorioamnionitis; ROM = rupture of membranes.
Preterm Labor was defined as estimated gestational age at delivery less than 37 weeks.

complications associated with amnioreduction for symptomatic polyhydramnios in the singleton pregnancies. Although the procedures were independent, the complications even following multiple amnioreductions were minimal.

Future collaborative studies are needed to be done by centers with standardized similar protocols to have a better understanding of the potential complications of the procedure.

Strengths of our study are that our subjects were limited to women with singleton pregnancies who had no additional intervention and underwent uniform standardized procedures performed by skilled maternal fetal medicine physicians at a single high-volume fetal center. However, as a retrospective study, there are limitations in the design. We also were limited by the fact that no appropriately comparable subject cohort was available for comparative analysis since all patients with polyhydramnios and clinical symptoms are offered amnioreduction in our institution. In addition associating a complication to the amnioreduction procedure may be challenging; we reported the complications in the first 12 and 48 h of procedure assuming that the procedure related complications should happen in the first 2 days.

Conclusion

In conclusion, we noticed that outcomes of amnioreduction for symptomatic polyhydramnios in the singleton pregnancies are associated with minimal potential complications. This data can be used in better counseling patients with singleton pregnancies and polyhydramnios.

Disclosure of interests

The authors did not report any potential conflicts of interest.

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None.

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