A cross-sectional study on the effect of ultrasound in detecting congenital anomalies and perinatal outcomes

Dr. Maytham Sabeeh Ismail

M.B.Ch.B. \ (Radiology Master)
Ministry of Higher Education and Scientific Research, Al-Muthanna University, College of Medicine, Al-Muthanna, Iraq.
maytham.sobeih@mu.edu.iq

ABSTRACT

This study aimed to find out the effect of ultrasound in detected congenital anomalies, and perinatal outcomes and 150 patients were divided into two groups (90 patients diagnosed with ultrasound with an average age of 30.9 ± 5.5 years) (60 cases were a control group with an average age of 29.5 ± 4.2).

In this study, information received between January 1, 2019, and December 31, 2020, was used as databases of different hospitals in Iraq, Department of Obstetrics and Gynecology, which maintains a record of all newborns that show one or more congenital anomalies and statistical analysis was performed using IBM SOFT SPSS 22 for Windows, and the final document was prepared with Microsoft Office package.

The results that found in this study were Encephalocele 3 (3.3%) for the ultrasound group ،2 (3.3) for the control- Ventriculomegaly for the ultrasound group, 7 (7.8), 4 (6.7) for the control, Anencephaly for 5 (5.5) and over the control group was 1 (1.7), Posterior fossa cyst with 4 (4.4) for the ultrasound patient while for the control group it was 1 (1.7), Hydrops fetalis for ultrasound group 6 (6.7) and 2(3.3%) for the control group.

In this study, the logistic analysis and ultrasound diagnosis showed a direct relationship between them in the detection of congenital malformations, and this reveals the great role to the value of the diagnosis used in our current study.

Keywords: Ultrasound, Detected, Encephalocele, Posterior, Perinatal, Diagnosis.

Introduction

Congenital malformations have a significant impact on infant morbidity and mortality [1.2]. They are the first cause of infant mortality in countries which managed to reduce mortality from infectious and perinatal causes. Its spread worldwide is estimated at between (4-9) births in Iraq. In 2016, congenital anomalies and chromosomal abnormalities were the second cause of death among live births, with 120 deaths due to infant mortality since the 1970s [3,4,5]. Hypertensive disorders of pregnancy affect up to 10% of pregnant women, and the combined global incidence of pre-eclampsia (PE) is approximately 3% 2. There are significant differences between developed and developing countries—development, which may be attributed to real differences or the data collection process. [6,7,8] PE and its complications are the major causes contributing to maternal and fetal morbidity and mortality worldwide since the procedures were implemented. [9]

During the perinatal period, for its diagnosis and management, a patient with a rare disease requires a multidisciplinary approach that includes, in addition to the obstetrician,

geneticists, radiologists, pediatric surgeons, [10]neonatologists, and psychologists, among others. Without this approach, diagnosis, management, and counselling becomes extremely difficult and even poorer. Prenatal evaluation is the first approach for a fetal defect. [11]

At this stage, the most likely diagnosis and aetiology are approached, along with a follow-up plan and method of delivery. Although most defects do not include prenatal treatment, preparing the medical team to receive a newborn with problems is one of the elements that improve the postpartum condition and facilitate future care. [12]

Part of the diagnostic task includes imaging studies such as ultrasound and MRI. It is in this area where teamwork between the obstetrician and radiologist becomes important to reach a joint diagnosis. A chromosome study involves a sample of tissue, either a chorionic biopsy, amniotic fluid, or fetal blood. [13]

Until recently, the karyogram was able to demonstrate major structural defects of chromosomes such as trisomy, deletion, duplication, and translocation. In recent years, technological advances in microarray technology have allowed the detection of small deletions or small variants from the scheme of care responsible for rare genetic syndromes. [14]

Patient and method

Collection sample

Data on patients were collected from different hospitals in Iraq, where a cross-sectional study was conducted on Iraqi patients between the ages of 20-40 years to know the effect of ultrasound in detecting congenital anomalies and perinatal outcomes.

Congenital malformations have gained relative importance in neonatal diseases requiring hospitalization in the special care unit for antenatal check-ups, which are performed in a structured manner.

Methodology

In this study, information received between January 1, 2019, and December 31, 2020, was used as databases of different hospitals in Iraq, Department of Obstetrics and Gynecology, which maintains a record of all newborns that show one or more congenital anomalies.

A special file is prepared for all newborns with congenital defects, in which the history of mothers, pregnancy, childbirth, and children is recorded. The vital diagnosis of hospitalization of the deformed patient is considered with regard to what the deformity means in terms of survival and the individual's integration into normal life. And was estimated the day of hospitalization for the deformed patient as the fact of his admission to the hospital.

In this study, ultrasound was relied upon by perinatologists and radiologists

Ultrasound examination is performed using a black and white (2D) probe. Depending on the quality of the device used, a good two-dimensional section quality makes the examination easier. A three- or four-dimensional (2D / 2D) ultrasound examination is used depending on the site, especially in the diagnosis of superficial anatomy and congenital anomalies.

A questionnaire was designed by experts from the Infertility Technical Group of the Ministry of Public Health, and a database was created using Microsoft Access; statistical analysis was performed using IBM SOFT SPSS 22 for Windows, and the final document was prepared with the Microsoft Office package.

Absolute frequencies were calculated for qualitative, prevalence, quantitative variables, mean and standard deviation, with 95% confidence intervals expected in all cases.

Results

Table 1- Demographic results of study patient

Variable	***Patient with ultrasound, N=90***	***Control, N=60***	***P-value <0.05***
AGE (Mean±SD)	***30.9±5.5***	***29.5±4.2***	***0.556***
BMI	***30.1±3.6***	***29.2±4.1***	***0.47***
comorbidities			
Obese	***34***	***21***	***0.44***
Diabetes	***20***	***19***	***0.45***
Hypertension	***26***	***12***	***0.05***
Heart disease	***10***	***8***	***0.32***
Smoking			
Yes	***10***	***7***	***0.1***
No	***80***	***53***	***0.78***
Education			
Low	***20***	***15***	***0.06***
Secondary	***19***	***15***	***0.39***
College	***40***	***25***	***0.01***
High	***11***	***5***	***0.4***
Economic level			
Low	***19***	***12***	***0.6***
Moderate	***50***	***35***	***0.7***
High	***21***	***13***	***0.56***
Previous pregnancy			
0	***30***	***20***	***0.04***
1	***35***	***25***	***0.07***
2	***15***	***10***	***0.98***
3	***10***	***5***	***0.31***
Live born infant			
Mean ±SD (KG)	***3.1±0.5***	***3.2±0.4***	***0.67***

Table 2- Assessment of congenital malformations in groups of patients who underwent ultrasound test and the control

congenital malformations	***Ultrasound***	***Control***
Encephalocele	***3 (3.3)***	***2 (3.3)***
Ventriculomegaly	***7 (7.8)***	***4 (6.7)***
Anencephaly	***5 (5.5)***	***1 (1.7)***
Posterior fossa cyst	***4 (4.4)***	***1 (1.7)***
Hydrops fetalis	***6 (6.7)***	***2 (3.3)***

Figure 1- Outcomes of study according to mortality and morbidity

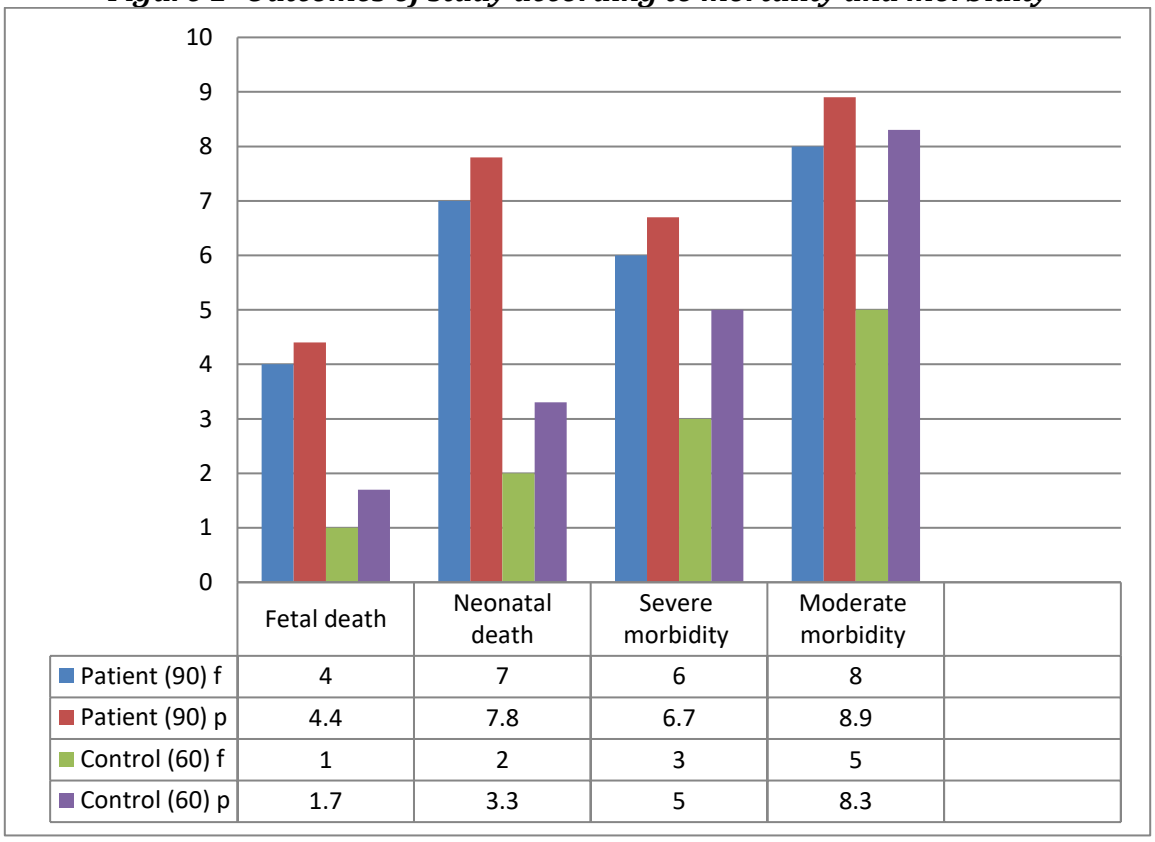

Table 3- Person correlation between good results with ultrasound and control group

Variable	***Good results***	***Ultrasound***	***Control***
R correlation	***1.0***	***+0.96***	***+0.6***
Sig	***--***	***0.002***	***0.05***
N	***150***		

Table 4- Logistic regression to the analysis risk factor of the study

Variable	*CS 95%*	*P-Value*
Age	*0.9 (0.5-1.1)*	*0.5*
Smoking	*0.5 (0.2-0.9)*	*0.43*
Ventriculomegaly	*1.7 (1.2-2.2)*	*0.034*
Posterior fossa cyst	*1.6 (1.1-2.0)*	*0.022*
Anencephaly	*1.4 (1.2-2.4)*	*0.054*

Discussion

In this study, a cross-sectional study was conducted on Iraqi patients to know the effect of ultrasound in detecting congenital anomalies and perinatal outcomes.

Where the average age ranged from 20-40 years for both groups, and it was noted that the average body mass index increased to the older ages.

The prevalence of comorbidities was noted in this study, especially obesity, for 34 patients in the ultrasound group and 21 patients in the control group, as shown in Table 1.

while Evaluation of congenital malformations in groups of patients who underwent ultrasound and control the results, which found Encephalocele 3 (3.3%) for the ultrasound group،

2 (3.3) for control- Ventriculomegaly for ultrasound group 7 (7.8), 4 (6.7) for control, Anencephaly for 5 (5.5), and over the control group was 1 (1.7), Posterior fossa cyst with 4 (4.4) for the ultrasound patient while for the control group it was 1 (1.7)

Before the widespread use of obstetric ultrasound, most fetal abnormalities were known only at the time of birth, and from then on, the pediatrician and obstetrician began to search for causative factors, trying to provide parents with an explanation, step, and prediction. Currently, ultrasound has made it possible to identify, sometimes at an early stage, a large number of fetal anomalies, in addition to changes in the volume of amniotic fluid, conditions associated with fetal structural disorders, or genetic abnormalities.

The current study included 25 cases in the ultrasound group and 11 control group of congenital malformations that were detected; this frequency does not reveal the real occurrence of the problem in our environment because despite the spread of the study in primary care centers and in all ultrasound centers of the first level, perhaps not all patients with suspected fetal abnormalities were referred to the study cohort; In addition, many patients with a malformed fetus at the time of delivery did not receive an ultrasound assessment during pregnancy or did not receive prenatal care.

Due to the characteristics of this study, the specificity of the technique could not be accounted for, which is limited ourselves to defining the relationship between prenatal ultrasound findings and neonatal outcomes.

We classify this association as complete, partial, or none, as the full association was achieved in 80% of cases, according to the person correlation between good results with ultrasound and the control group.

Conclusion

Birth defects are also called birth defects, congenital disorders, or congenital anomalies. These are structural or functional abnormalities, such as metabolic disorders,

that occur during intrauterine life and are detected during pregnancy, childbirth, or later in life.

Intrauterine diagnosis of these defects by ultrasonography is valuable, as it allows to provide information regarding disease characteristics, progression, therapeutic possibilities, prognosis, risk of recurrence in future pregnancies, and prenatal counselling.

Once the diagnosis is made with certainty, it will be possible to choose to terminate the pregnancy in countries where abortion is legal or to schedule the birth in a highly complex center with cardiovascular facilities to receive the new-born and provide the required medical care immediately.

References

1. Sitkin NA, Ozgediz D, Donkor P, et al. Congenital anomalies in low- and middle-income countries: the unborn child of global surgery. World J Surg 2015; 39:36–40. 10.1007/s00268-014-2714-9 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
2. Farmer D.Debas HT, Surgical interventions for congenital anomalies, in essential surgery: disease control priorities. One 3rd edn Washington (DC, 2015. [Google Scholar]
3. WHO WHO Fact Sheets - Congenital Anomalies 2015. Available: http://www.who.int/news-room/fact-sheets/detail/congenital-anomalies [Accessed 12 May 2018].
4. Badrinath R, Kakembo N, Kisa P, et al. Outcomes and unmet need for neonatal surgery in a resource-limited environment: estimates of global health disparities from Kampala, Uganda. J Pediatr Surg 2014; 49:1825–30. 10.1016/j.jpedsurg.2014.09.031 [PubMed] [CrossRef] [Google Scholar]
5. Bradnock TJ, Marven S, Owen A, et al. Gastroschisis: one-year outcomes from a national cohort study. BMJ 2011;343: d6749 10.1136/bmj.d6749 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
6. Wright NJ, Zani A, Ade-Ajayi N. Epidemiology, management and outcome of gastroschisis in sub-Saharan Africa: results of an international survey. Afr J Paediatr Surg 2015; 12:1–6. 10.4103/0189-6725.150924 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
7. Alldred SK, Takwoingi Y, Guo B, Pennant M, Deeks J J, Neilson JP, et al. First-trimester ultrasound tests alone or in combination with first-trimester serum tests for Down's syndrome screening. Cochrane Database of Systematic Reviews 2017, Issue 3. Art. No: CD012600. [DOI: 10.1002/14651858.CD012600] [PMC free article] [PubMed] [CrossRef] [Google Scholar]
8. Garcia J, Bricker L, Henderson J, et al. Women's views of pregnancy ultrasound: a systematic review. Birth 2002; 29:225- 50.
9. Seeds JW. The routine or screening obstetrical ultrasound examination. Clin Obstet Gynecol 1996; 39:814-30.
10. Tunon K, Eik-Nes SH, Grottum P. The impact of fetal, maternal, and external factors on prediction of the day of delivery by the use of ultrasound. Ultrasound Obstet Gynecol 1998; 11:99-103.
11. Bricker L, Garcia J, Henderson J, et al. Ultrasound screening in pregnancy: a systematic review of the clinical effectiveness, cost-effectiveness and women's views. Health Technol Assess 2000; 4:1-193.
12. Rayburn WF, Jolley JA, Simpson LL. Advances in ultrasound imaging for congenital malformations during early gestation. Birth Defects Res A Clin Mol Teratol 2015; 103:260-8
13. Rice PL, Naksook C. Pregnancy and technology: Thai women's perceptions and experience of prenatal testing. Health Care Women Int 1999; 20:259-78.
14. Larsen T, Nguyen TH, Munk M, et al. Ultrasound screening in the 2nd

trimester. The pregnant woman's background knowledge, expectations, experiences, and acceptances. Ultrasound Obstet Gynecol 2000; 15:383-6.
15. Lalor JG, Devane D. Information, knowledge and expectations of the routine ultrasound scan. Midwifery 2007; 23:13-22.
16. Eurenius K, Axelsson O, Gallstedt-Fransson I, et al. Perception of information, expectations and experiences among women and their partners attending a second-trimester routine ultrasound scan. Ultrasound Obstet Gynecol 1997; 9:86-90.
17. Basama FM, Leonard B, Leighton M. Audit: women's perception and knowledge of the 20 weeks anomaly scan. J Obstet Gynaecol 2004; 24:44-6.
18. Chan LW, Chan OK, Chau MC, et al. Expectation and knowledge of pregnant women undergoing first and second-trimester ultrasound examination in a Chinese population. Prenat Diagn 2008; 28:739-44.
19. Wyszynski DF, Perandones C, Bennun RD. Attitudes toward prenatal diagnosis, termination of pregnancy, and reproduction by parents of children with nonsyndromic oral clefts in Argentina. Prenat Diagn 2003; 23:722–7. 10.1002/PD.674 [PubMed] [CrossRef] [Google Scholar]
20. Carvalho MHB, Brizot ML, Lopes LM, et al. Detection of fetal structural abnormalities at the 11–14-week ultrasound scan. Prenat Diagn 2002; 22:1–4. 10.1002/PD.200 [PubMed] [CrossRef] [Google Scholar]
21. Luiza A, Noronha de Góis D, Santos J, et al. A descriptive epidemiology study of oral cleft in sergipe, Brazil. Int Arch Otorhinolaryngol 2013; 17:390–4. 10.1055/s-0033-1352502 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
22. Tannuri ACA, Sbragia L, Tannuri U, et al. Evolution of critically ill patients with gastroschisis from three tertiary centers. Clinics 2011; 66:17–20. 10.1590/S1807-59322011000100004 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
23. Vilela PC, Ramos de Amorim MM, Falbo GH, et al. Risk factors for the adverse outcome of newborns with gastroschisis in a Brazilian Hospital. J Pediatr Surg 2001; 36:559–64. 10.1053/jpsu.2001.22282 [PubMed] [CrossRef] [Google Scholar]
24. Correa C, Mallarino C, Peña R, et al. Congenital malformations of pediatric surgical interest: prevalence, risk factors, and prenatal diagnosis between 2005 and 2012 in the capital city of a developing country. Bogotá, Colombia. J Pediatr Surg 2014; 49:1099–103. 10.1016/j.jpedsurg.2014.03.001 [PubMed] [CrossRef] [Google Scholar]
25. De Rovetto CR, et al. Unilateral renal agenesis: case review of ambulatory pediatric nephrology clinics in Cali. Colombia Medica 2010; 41:52–9. [Google Scholar]
26. Rosselli P, et al. Prenatal ultrasound diagnosis of congenital talipes equinovarus in Bogota (Colombia) between 2003 and 2012. Iowa Orthopaedic Journal 2015; 35:156–9. [PMC free article] [PubMed] [Google Scholar].