PROFILE OF NEWBORNS WITH GASTROSCHISIS AND THE IMPLICATIONS TO NURSING CARE: INTEGRATIVE REVIEW

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ABSTRACT This is an integrative review aimed to analyze scientific evidence about the profile of newborns with gastroschisis and the implications to nursing care. Data was collected in virtual health databases such as BVS, MEDLINE/PUBMED and CINAHL between 2004 and 2016. We analyzed 19 publications that fit the established criteria. The characteristics of newborns with gastroschisis were grouped into four categories: (i) risk factors, prenatal diagnosis, maternal variables and neonatal profile for gastroschisis; (ii) clinical and surgical treatment and newborn care for gastroschisis; (iii) intestinal complications and postoperative of the newborn with gastroschisis; (iv) prognosis of the newborn with gastroschisis and the implications to the nursing care. The presence of this malformation compromises neonatal prognosis, and it is associated with obstetric and neonatal complications, like prematurity and low weight at birth, intestinal complications, sepsis and prolonged hospitalization. Data in the literature has shown that nursing care in gastroschisis is poorly documented. This highlights the necessity of developing more researches to sustain the systematization of nursing care to meet these newborn needs.

KEYWORDS Gastroschisis, Abdominal wall, Newborn

Introduction

Gastroschisis is a congenital defect of the anterior abdominal wall that allows herniation of the abdominal viscera, usually on the right side, without covering the hernial sac. The small and large intestines are usually the only externalized organs of the abdominal wall. The spleen and liver may also be involved, but with a much lower incidence [1-3].

DOI:10.5455/IJMRCR.newborns-gastroschisis
First Received: September 09, 2019
Accepted: January 06, 2020
Editor-in-chief: Ivan Inkov (BG)
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The incidence of gastroschisis has been increasing in the last decades in several populations, going from 1-2 to 4-5 / 10,000 live births. There is an association with low maternal age (<20 years), but not usually associated with other structural or karyotype abnormalities. When associated malformations occur, they commonly happen at the intestinal level, such as intestinal infarct or intestinal atresia [4-6].

Perinatal mortality of gastroschisis depends on prematurity, intrauterine growth restriction, low weight at birth and surgical complications. In addition, there are intestinal disorders that increase mortality and morbidity of patients with gastroschisis, such as atresia and volvulus and the complications of these disorders - necrotizing enterocolitis and intestinal perforation. Regarding the exposed content, gastroschisis can be classified as simple when only the intestine is externalized and complex when not only the intestine, but the stomach and other organs are also herniated. In the latter case, the prognosis is poor, with

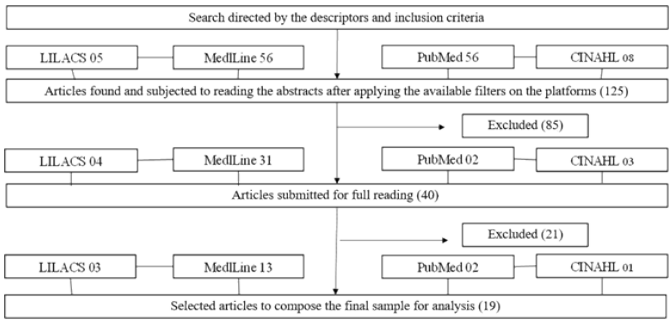

Figure 1 Article selection flowchart.

increased mortality rates [7-9].

Prenatal diagnosis of gastroschisis contribute to better monitoring of fetal conditions and adequate perinatal care. This results in significant improvements in the mortality rates of these children. When the malformation is not discovered before delivery, it results in the absence of additional care in childbirth aimed at reducing the contamination of the abdominal cavity. The early identification allows transfer to tertiary hospitals before delivery and shorter time between delivery and operation, which provide better survival of newborns [10,11].

The conducts of health professionals regarding the newborn with gastroschisis must be specific and of accurate. This type of pathology, although rare, as a whole becomes relatively frequent and requires the work of the multidisciplinary team, including neonatologist, pediatric surgeon, geneticist, radiologist, nutritionist, nurse and others [12]. For this reason, knowledge about congenital disabilities and behaviours to be adopted by nurses and other team members is of prime importance in the guidance of parents and family members. This allows them to clarify their disability concerns and to be encouraged to pursue a better quality of life within limits imposed on the child [13,14].

Studies about gastroschisis enlighten the knowledge of this problem and generate reflections about health actions in the prevention and control of this disease. Congenital malformation follows a linear and growing trend, which reflects directly on the care of newborns and their families. Nowadays, patients with malformations consist of a new clientele profile, with diverse and special health needs and demands [11,15-17].

Therefore, the present study aimed to analyze evidence available in the literature, to identify, gather and synthesize the knowledge produced about the profile of newborns with gastroschisis and the implications for nursing care.

Material and Methods

In this study, we performed an integrative literature review. The Integrative analysis is a specific method that allows the analysis and synthesis of knowledge about a given phenomenon. The method enables the inclusion of several methodologies and has a strong influence on evidence-based nursing practices [18].

After defining the theme, a search was done in the virtual health databases: Latin American and Caribbean Health Sciences Information System - LILACS, National Library of Medicine - MEDLINE / National Institutes of Health – PubMed and Cumulative Index to Nursing and Allied Health Literature-CINAHL. Inclusion criteria were: publications on gastroschisis, articles based on scientific research and original article; articles are written in Portuguese, English and Spanish; made available in full in the online database; production published from 2004 to 2016. In the search strategy in the BVS, MEDLINE / PubMed and CINAHL databases, the following descriptors were used, according to their definition in DeCS (Health Sciences Descriptors): gastroschisis, abdominal wall and newborn. The search strategy in the BVS used the descriptors "GASTROSQUISE" [Word] and "ABDOMINAL WALL" [Word] and "NEWBORN" [Word], with five publications found. The MEDLINE database used the descriptors "gastroschisis" [Subject descriptor] and "abdominal wall" [Subject descriptor] and "newborn" [Subject descriptor], with 56 publications found. The MEDLINE / PubMed database used the descriptors ("gastroschisis" [MeSH Terms] and "abdominal wall" [MeSH Terms]) and "infant, newborn" [MeSH Terms], with 56 publications found. In the CINAHL database used the descriptors “gastroschises” and “newborn”, and eight publications were found (Figure 1).

We identified 125 publications potentially eligible for inclusion in this review. An attentive reading of the abstracts of these papers was carried out allowing the selection of 40 articles for a full reading. A total of 106 publications were excluded because they addressed generalized birth defects or other digestive system defects or did not meet the proposed theme, or were duplicated articles. In the end, 19 publications met the inclusion criteria, being performed the analytical and interpretative reading allowing content analysis and synthesis and elaboration of categories.

The main differential diagnosis of gastroschisis is the omphalocele, which is also characterized by an abdominal wall closure defect, but it is a midline defect with herniated abdominal viscera and usually covered by a membrane consisting of peritoneal, amnion and Wharton jelly, with the umbilical vessels inserted in this membrane and not in the abdominal wall [19]. This malformation will not be addressed in this study due to its different prognosis and etiology compared to gastroschisis.

Results and Discussion

The sample consisted of 19 articles that were characterized based on the identification of the study title, authors, journal, year of publication and type of study. As for the language one was in Portuguese, two were in Spanish and the others in English, the period of publication was from 2006 to 2016. Considering the publication periodical, about 52.6% were in American journals. As for the type of study, 78.9% were retrospective, of which 33.3% were conducted in the United States. Approximately 21.05% of the studies were conducted in the United Kingdom, and about 79% of the studies were conducted from secondary data from mothers and newborns (Table 1).

The thematic addressed in the articles showed great variability: 52% referred to surgical treatment using the Silo and other surgical techniques for congenital defects, approximately; 37% addressed the most common anterior abdominal wall defects (gastroschisis and omphalocele), 21.05% described postoperative and gastrointestinal complications and the same percentage of studies dealt with maternal and neonatal clinical characteristics. Just one study [25] talked about risk factors and two papers (34,38) discussed synthetic and biomaterial prostheses in the correction of these congenital disabilities.

Gastroschisis was the main theme of 57.9% of articles. Although the other articles did not focus solely on gastroschisis, they were not excluded from the analysis because they included management, risk factors, maternal and neonatal clinical characteristics, surgical treatment and complications of the most common congenital disabilities in the abdominal wall, where

Table 1: Description of categories and distribution of the grounding references.	
Category title	**References**
Risk factors, prenatal diagnosis, maternal variables and neonatal profile for gastroschisis.	4, 17, 20, 21, 23, 24, 25, 26, 32, 37 e 39
Clinical and surgical treatments and care of the newborn with gastroschisis.	16, 20, 21, 22, 27,30, 31, 33 e 36
Intestinal and postoperative complications of the newborn with gastroschisis.	24, 27, 32 e 28
Prognosis of the newborn with gastroschisis and the implications for nursing care.	20, 25, 28 e 40

Table 2: Distribution of studies regarding gastroschisis according to: study identification, year of publication, type of study, objectives and main results.

Title	Authors	Year	Journal	Study Type
Defectos de Pared Anterior del Abdomen: Diagnóstico prenatal y seguimento.	Muñoz OP, Rodríguez AJG, Valdés OV, Godoy LJ, Ossandón CF, Pizarro RO, Frez BP.	2006.	Revista Chilena de Ultrasonografía.	Retrospective
What is the best parenteral hydration solution to be used for postoperative treatment of newborns with gastroschisis? Hospital das Clínicas Children's Institute Experience from USP School of Medicine PEDIATRIC	Tannuri ACA, Silva LM, Leal AJG, Ricardi LRS, Tannuri U.	2010.	Faculdade de Medicina da USP. PEDIATRIA.	Retrospective
Tratamiento de los defectos de la pared abdominal (gastrosquisis y onfalocele) en el Hospital Universitario San Vicente de Paúl, Medellín, 1998-2006.	Toro MNH, Rave MEA, Gómez PMJ.	2010.	IATREIA.	Retrospective
Outcome of antenatally diagnosed abdominal wall defects.	Fratelli, AN, Papageorghiou T, Bhide A, Sharma A, Okoye B Thilaganathan B.	2007.	Ultrasound Obstet Gynecol.	Retrospective
Challenges and outcomes of management of anterior abdominal wall defects in a Nigerian tertiary hospital.	Abdur-Rahman LO, Abdulrasheed NA, Adeniran JO.	2010.	African Journal of Paediatric Surgery.	Retrospective
Record linkage in Scotland and its applications to health research.	Fleming M, Kirby B, Penny k.	2012.	Journal of Clinical Nursing	Retrospective cohort
Omphalocele and Gastroschisis and Associated Malformations.	Stoll C, Alembik Y, Dott B, Roth M-P.	2008	American Journal of Medical Genetics.	Prospective cohort

Title	Authors	Year	Journal	Study Type
Method to our madness: an 18-year retrospective analysis on gastroschisis closure.	Banyard D, Ramones T, Phillips SE, Leys CM, Rauth T, Yang EY	2010.	Journal of Pediatric Surgery.	Retrospective
A population-based pediatric surgery network and database for analyzing surgical birth defects. The first 100 cases of gastroschisis.	Skarsgard ED, Claydon J, Bouchard S, Kim PCW, Lee SK, Laberge J-M, McMillan D, Dadelszen PV, Yanchar N	2008.	Journal of Pediatric Surgery.	Retrospective population-based
Congenital abdominal wall defects and testicular maldescent—a 10-year single-center experience.	Yardley IE, Bostock E, Jones MO, Turnock RR, Corbett HJ, Losty PD.	2012.	Journal of Pediatric Surgery.	Retrospective
Iowa City. Outcomes of plastic closure in Gastroschisis.	Orion KC, Krein M, Liao J, Shaaban AF, Pitcher GJ, Shilyansky J,	2011.	Surgery.	Retrospective
Modified silo technique—An easy and effective method to improve the survival rate of neonates with gastroschisis in Shanghai.	Hong L, Wu Y, Yan Z, Chen S, Wang J.	2009.	European Journal of Obstetrics & Gynecology and Reproductive Biology	Clinical trial
Prenatal intraabdominal bowel dilation is associated with postnatal gastrointestinal complications in fetuses with gastroschisis.	Huh NA, Hirose S, Goldstein RB.	2010.	American Journal of Obstetrics & Gynecology.	Retrospective analysis
Staged reduction of gastroschisis using preformed silos: practicalities and problems.	Lansdale N, Hill R, Gull-Zamir S, Drewett M, Parkinson E, Davenport M, Sadiq J, Lakhoo K, Marven S.	2009.	Journal of Pediatric Surgery.	Retrospective analysis

Title	Authors	Year	Journal	Study Type
Single-center 10-year experience in the management of anterior abdominal wall defects	Rahn S, Bahr M, Schalamon J, Saxena AK.	2008.	Hernia.	Experimental study
Gastroschisis closure—does method matter?	Weinsheimer RL, Yanchar NL, Bouchard SB, Kim PK, Laberge JM, Skarsgard ED, Lee SK, McMillan D, Dadelszen PV	2008.	Journal of Pediatric Surgery.	Retrospective
Minimally Invasive Surgery in Children with a History of Congenital Abdominal Wall Defects.	Hill SJ, Wulkan ML.	2013.	JOURNAL OF LAPAROENDOSCOPIC & ADVANCED SURGICAL TECHNIQUES	Retrospective
Omphalocele, gastroschisis: epidemiology, survival, and mortality in Imam Khomeini Hospital, Ahvaz- Iran.	Askarpour S, Ostadian N, Javaherizadeh H, Chab S.	2012.	POLSKI PRZEGLĄD CHIRURGICZNY.	Retrospective
Spontaneous sutureless closure of the abdominal wall defect. In gastroschisis using a commercial wound retractor system.	Ogasawara Y, Okazaki T, Kato Y, Lane GJ, Yamataka A.	2009.	Pediatr Surg Int.	Experimental study

(Source: COELHO, AS; et al., 2016)

the gastroschisis theme was also inserted.

Four categories were described in Table 1 according to the underlying texts.

Some of the publications analyzed are presented in the following table (Table 2) with information about the journal, authors, year of publication, place of publication and type of study.

Risk factors, prenatal diagnosis, maternal variables and neonatal profile for gastroschisis.

The incidence rate for gastroschisis ranges from 1 to 5 per 10,000 live births, with no gender preference [4,39]. Studies have consistently shown that young women – with a mean age of 20 years – are more likely of delivering a fetus with gastroschisis when compared to the general obstetric population [24,25]. This can be dependent on lifestyle-related factors in this population including smoking, illicit drug use, alcohol consumption, in addition to low socioeconomic status, gestational age, prematurity and low weight [20,25,37]. Although many risk factors have been proposed, studies indicate that low maternal age is the strongest, clearest and most reproductive risk factor for gastroschisis [20, 25, 26].

The benefits of prenatal diagnosis of gastroschisis are many and include family preparation and support, adequate birth planning with obstetric, surgical and neonatal teams, risk categorization and the possibility of developing action protocols [20].

The use of large-scale obstetric ultrasonography, as well as maternal alpha-fetoprotein dosing, has allowed the detection of fetal abdominal wall defects mainly from the second semester of pregnancy. Elevated maternal alpha-fetoprotein in the second semester of pregnancy-associated with the characteristic image on obstetric ultrasound define the prenatal diagnosis. Ultrasound image reveals a para-umbilical defect of the abdominal wall with visceral herniation [20,23,32].

Studies show that newborns with gastroschisis are more likely to develop cases of prematurity, low birth weight, small gestational age and ulcerative colitis [20,25]. Preterm infants affected by gastroschisis have higher morbidity and mortality [20], sepsis [24], longer time to reach full enteral nutrition and longer hospital stay [21,17].

Clinical and surgical treatments and care of the newborn with gastroschisis The viscera should be carefully handled and placed in a plastic bag filled with saline or, failing this, wrapped in sterile plastic wrap. This allows immediate observation of the gutted content (checking for areas of ischemia, necrosis or perforation) as well as decreasing fluid loss. If neither procedure is possible, wrap the viscera in sterile pads soaked in warm saline. Insert orogastric tube to decompress stomach [16,20].

After gastroschisis correction, newborns should experience large exudative losses (water, sodium and protein) to the "third space" through the walls of the inflamed intestinal loops. Venous hydration should be installed immediately with crystalloid infusion and careful administration of colloid solutions with the benefits of preventing hyponatremia, which relates to longer periods of orotracheal intubation [21].

One of the significant complications of gastroschisis closure is visceral-abdominal disproportion because the abdominal cavity is too small to allow primary closure of the abdominal wall without compromising gastrointestinal and pulmonary function [36].

During the last two decades, the debate on the best surgical approach has been about reducing gastroschisis with primary closure or silo placement with progressive reduction and secondary closure. The current trend is that without visceral-abdominal disproportion, primary closure should be preferred. In the case of disproportion, the silo should be placed and the progressive reduction should be performed [27,31,33].

Primary closure aims to minimize bacterial contamination, sepsis, hypothermia and metabolic changes. However, the optimal treatment (primary or in stages) is not yet established [22,30]. In a study that analyzed 99 cases of gastroschisis, no differences in mortality rates were observed. However, patients undergoing silo had longer mechanical ventilation, greater need for volume replacement, longer hospitalization and longer parenteral nutrition [35].

Intestinal and postoperative complications of the newborn with gastroschisis. The main postnatal complications of these newborns are not due to the defect of the abdominal wall itself, nevertheless, to the presence of intestinal complications associated with gastroschisis such as areas of atresia, volvulus, perforation, infarction, necrosis segments or malrotation [24,27,32].

For this reason, the presence of these pathologies compromises the neonatal prognosis, as they complicate the intraoperative act, may lead to the need for extensive intestinal resections, with lengthy periods of hospitalization, long oral fasting and extensive use of prolonged parenteral nutrition, evolution to short bowel syndrome with consequent dehydration and malabsorption and need for surgical reintervention [27,28]. Besides, prolonged use of parenteral nutrition may lead to liver damage [28].

After primary repair of gastroschisis without the use of mesh or silos and continuous use of mechanical ventilation may have other complications. One of them is the abdominal compartment syndrome, which results in a compromised diaphragmatic excursion, decreased venous return through the inferior vena cava with a consequent decrease in cardiac output as well as poor pulmonary, intestinal, hepatic and renal functions [24].

A study examining 43 fetuses with intra-abdominal intestinal dilation (IBD) found that they were significantly more likely to have postnatal intestinal complications (38% vs 7%; P 0.037) [32]. Furthermore, the presence of multiple IBD malrotations (n = 6) as opposed to single malrotation (n = 10) was highly associated with intestinal complications and increased time to full enteral feeding and increased hospital stay.

Prognosis of the newborn with gastroschisis and the implications for nursing care The prognosis of gastroschisis has changed dramatically in recent years, with a significant increase in the survival rate of these newborns. Prenatal diagnosis, improved newborn care, new surgical techniques combined with parenteral nutrition may be responsible for this improved prognosis [20].

However, factors related to the deleterious effects of parenteral nutrition still need to be resolved [28], requiring further research to reduce the time of use or to introduce new substances with lower liver toxicity in the preparation of parenteral nutrition.

In addition to the aforementioned related risks, morbidity and mortality are also associated with antenatal factors such as fetal growth restriction, preterm birth, low birth weight newborns and low Apgar scores, as well as a high rate of unexpected perinatal death [25,28].

When thinking about systematizing nursing care, an immediate plan for the newborn with gastroschisis is proposed, based on nursing diagnoses and interventions [40]. In this study, some priority nursing diagnoses were raised for these newborns: inef-

fective baby's feeding pattern, impaired swallowing, constipation, shock risk, impaired maternity or paternity risk, impaired bond risk, caregiver role tension, risk infection, risk of aspiration, risk of disorganized behaviour of the baby, impaired skin integrity, impaired tissue integrity, risk of body temperature imbalance, risk of ineffective gastrointestinal tissue perfusion and acute pain.

In this manner, the identification of nursing diagnoses provides nurses with planning of their interventions, according to the needs of the newborn, individualizing care, identifying real or risky problems that need effective action, leading to short and long term preventive actions [40].

Therefore, the nurse has an essential role in the care of newborns with congenital malformations, and some actions should be taken by this professional: mechanical ventilator care, monitoring, collection of exams, administration of vasoactive drugs and physical examination, monitoring of vital and hemodynamic signs, nutritional support, drug infusion, pain treatment and control, accurate measurement of vital signs, dressings, implantation of peripherally inserted central catheter and actions developed with family members [40].

According to the bibliography consulted, it is clear that nursing care in gastroschisis is poorly documented. This highlights the need to develop more research to support the elaboration of nursing care systematization to meet the characteristics of these newborns.

Conclusion

The present integrative review concluded that the presence of gastroschisis compromises the neonatal prognosis since it is associated with obstetric and neonatal complications, such as prematurity and low birth weight, intestinal complications, sepsis and prolonged hospitalization. Some surgical techniques benefit postnatal conditions, and prenatal diagnosis allows better monitoring of fetal conditions.

Few clinical trials have been found on the research, especially in surgical treatment. This demonstrates the need for studies with designs that may contribute to providing strong evidence for a good prognosis for the newborn with gastroschisis.

Children with congenital malformations require specialized care, not only during hospitalization, but after discharge as well, as these clients require continuous and complex care. In addition to the in-hospital care, the nurse is responsible for providing proper discharge guidance, educational measures and family orientation. These measures will reflect on the proper recovery and management of these patients by family caregivers.

Throughout this process, the nurse has a fundamental role within the multidisciplinary team, especially in relation to direct action in the care of these newborns. Therefore, it is essential to search for specific knowledge and skills to provide such assistance. In this sense, studies and proposals should continue in order to qualify and subsidize nursing practice.

It is expected that the results of this study may contribute to the performance of health professionals who treat newborns with gastroschisis, individually and peculiarly, taking into account the specific characteristics of these patients.

Conflict of Interest

There are no conflicts of interest to declare by any of the authors of this study.

Funding

None

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