MIELOMENINGOCELE A CONGENITAL DISEASE IN CHIAPAS

Aceituno Ovando, Grace[1]; Jiménez Ocaña María Rosalba[2]*

1 Estudiante de 3° Módulo la Licenciatura en Médico Cirujano de la Universidad Autónoma de Chiapas, Facultad de Medicina Humana, "Dr. Manuel Velasco Suárez", Campus-II. UNACH
2 Médica especilista en Ginecología y Obstetricia. Catedrática y Directora de la Facultad de Medicina Humana, "Dr. Manuel Velasco Suárez", Campus-II, UNACH

* *Autor de correspondencia:* grace.aceituno72@unach.mx

ABSTRACT

Introduction: Neural tube defects (NTDs) are congenital defects of the central nervous system, the result of inadequate closure in some area of the neural tube, such as Spina Bifida, Anencephaly or Myelomeningocele (MMC), which are a group of conditions that occur during the embryological period of the human being. preventable and greatly affect the population. In Latin America and Mexico they are among the main causes of infant morbidity and mortality.

Material and Methods: Analysis of data series of newborns with NTDs in Tuxtla Gutiérrez Chiapas, Mexico from 2021-2023 generated from the data and evidence collected at the Dr. Rafael Pascacio Gamboa Regional Hospital and with information from the Tube Defects Epidemiological Surveillance System Neural and Craniofacial (SINAVE/DGE/Salud/2020.). 4 cases with NTDs were included, specifically Myelomeningocele who were born and reside in the State. The annual rates of cases with NTDs were exposed to identify possible factors that affect or increase said affections with the purpose of preventing said defects or, in that case, ensuring optimal secondary and tertiary prevention for the life of the affected individuals.

Results: In the period studied, which was 2021-2023, the NTDs with the highest incidence was MMC with 4 cases generated with diseases associated with hydrocephalus and microcephaly, of which only 10% of the cases consumed folic acid in a timely manner during the first trimester. of pregnancy. 100% of the cases are low-income and do not have higher education, as well as popular insurance. 90% attended 6 prenatal consultations or less.

Conclusions: NTDs are one of the most frequent problems in newborns, they require study, treatment and permanent surveillance, they can be treated with therapies or go as far as immobilization of the patient's upper and lower limbs, and even death. They represent with great force a morbidity and mortality in childhood that affects the individuals who suffer from them, these conditions are very difficult to bear in the economic, neurological, behavioral, social, emotional, psychological and physical aspect of the people who suffer from it and suffer as much as the affected individuals as well as their families, friends, society, and the health system. Especially because it is preventable, and the information on how to avoid it is of vital use in family planning and to provide more data on this group of diseases where there are more and more new data, methods and techniques on what they are and how to avoid them, cope with them with the purpose of reducing its incidence in the mexican and general population around the world.

Keywords: Mielomeningocele; Neural Tube Defects, Spina Bifida, Tuxtla.

Recibido: 11 de enero de 2022 **Aceptado:** 20 de abril de 2022 **Publicado:** 10 de mayo de 2023

DOI: https://doi.org/10.31644/AMU.V02.N01.2023.A04

ARTÍCULO EN INGLÉS
ARTICLE IN ENGLISH

MIELOMENINGOCELE UNA ENFERMEDAD CONGÉNITA EN CHIAPAS

Aceituno Ovando, Grace[1]; Jiménez Ocaña María Rosalba[2]*

1 Estudiante de 3° Módulo la Licenciatura en Médico Cirujano de la Universidad Autónoma de Chiapas, Facultad de Medicina Humana, "Dr. Manuel Velasco Suárez", Campus-II
2 Médica especilista en Ginecología y Obstetricia. Catedrática y Directora de la Facultad de Medicina Humana, "Dr. Manuel Velasco Suárez", Campus-II, Universidad Autónoma de Chiapas (UNACH).

** Corresponding author:* grace.aceituno72@unach.mx

RESUMEN

Introducción: Los defectos del tubo neural son defectos congénitos del sistema nervioso central, resultado del cierre inadecuado en alguna zona del tubo neural, como la Espina Bífida, Anencefalia o el Mielomeningocele que son un grupo de afecciones que suceden durante el período embriológico del ser humano, son prevenibles y afectan en gran magnitud a la población. En Latinoamérica y México se encuentran dentro de las principales causas de morbilidad y mortalidad infantil.

Material y métodos: Análisis de series de datos de recién nacidos con DTN en Tuxtla Gutiérrez Chiapas, México del 2021-2023 generado a partir de los datos y evidencia recolectada en el Nosocomio Regional Dr. Rafael Pascacio Gamboa y con información del Sistema de Vigilancia Epidemiológica de Defectos del Tubo Neural y Craneofaciales (SINAVE/DGE/Salud/2020.). Se incluyeron 4 casos con DTN, específicamente Mielomeningocele que nacieron y radican en el Estado. Se expusieron las tasas anuales de casos con DTN para identificar posibles factores que incidan o incrementen dichas afecciones con el propósito de prevenir dichos defectos o en dado caso asegurar una prevención secundaria y terciaria óptima para la vida de los individuos afectados.

Resultados: En el período estudiado que fue 2021-2023, el DTN con mayor incidencia fue el MMC con 4 casos generados con enfermedades asociadas con hidrocefalia y microcefalia, de los cuales solo el 10% de los casos consumieron ácido fólico de manera oportuna durante el primer trimestre de embarazo. El 100% de los casos son de bajos recursos y no cuentan con educación superior, así como seguro popular. El 90% acudieron a 6 consultas prenatales o menos.

Conclusiones: Los DTN son uno de los problemas más frecuentes en recién nacidos, requieren de estudio, tratamiento y vigilancia permanente, pueden tratarse con terapias o llegar hasta la inmovilización de miembros superiores e inferiores del paciente, e inclusive la muerte. Representan con gran fuerza una morbilidad y mortalidad en la infancia que afecta a los individuos que los padecen, estas afecciones son muy difíciles de sobrellevar en el aspecto económico, neurológico, conductual, social, emocional, psicológico y físico de las personas que lo sufren y padecen tanto como los individuos afectados como sus familias, amigos, sociedad, y el sistema de salud. En especial porque es prevenible, y la información acerca de cómo evitarla es de vital uso en planificación familiar y para aportar más datos sobre este grupo de enfermedades donde cada vez más hay nuevos datos, métodos y técnicas sobre qué son y cómo evitarlas, sobrellevarlas con el propósito de disminuir su incidencia en la población mexicana y general de todo el mundo.

Palabras clave: Mielomeningocele; Defectos de Tubo Neural, Espina Bífida, Tuxtla

Received: January 11, 2022 **Accepted:** April 20, 2022 **Published:** May 10, 2023

DOI: https://doi.org/10.31644/AMU.V02.N01.2023.A04

MYELOMENINGOCELE CONGENITAL MALFORMATION

Myelomeningocele consists of a malformation that occurs at the level of the central nervous system during the embryogenesis process, throughout the first month of gestation. In this malformation, a herniation of the spinal meninges and spinal cord occurs due to a defect in the closure of the posterior vertebral arches, also known as "open spinal dysraphism" [1, 2].

It is the second most serious form of spina bifida, after anencephaly, and the first compatible with life; the prognosis is determined by the level of the lesion, so the affectation will be greater the more cranial it is present. Typically, the lumbosacral region is affected and is associated with type II Chiari malformation, hydrocephalus, and second motor neuron dysfunction below the site of injury, as well as associated skeletal and/or visceral abnormalities [3].

The main clinical alterations of this condition include infections secondary to external exposure of the meninges, defects in the musculoskeletal system, and dysfunction in bladder and bowel sphincter control [4, 5].

Worldwide, neural tube defects have an incidence of 1 to 8 cases per 10,000 live births, conditions that represent the first cause of death in children under one year of age and the second cause of malformations, only behind heart disease. congenital. Likewise, myelomeningocele presents an incidence of 1-2 per thousand live births, being the most frequent form of spinal dysraphism and an important health problem worldwide, which can be prevented [6].

Recent studies estimate that, only in Europe, there is an average prevalence of spina bifida of 5.09/10,000 pregnancies, a figure that includes live newborns with the disease, those who have died, and those in whom it has been decided termination of pregnancy secondary to said cause [7, 8].

Now, in Mexico, various investigations have been carried out with respect to NTDs, such as the one carried out by García Camacho and his collaborators, who carried out a time series analysis of cases and deaths secondary to NTDs in Hidalgo between 2013 and 2018, in In which 187 cases were included, and whose objective was to identify probable incidence factors for the increase in said trend, they found that the incidence of said disorders was 58.7%, with Anencephaly being predominant (45%), and Myelomeningocele as second place. with 33% of the total cases reported, likewise, they found that the consumption of folic acid 3 months prior to pregnancy was present in only 7.5% of the mothers of the cases consumed folic acid three months prior to pregnancy and that more than 50 % (55%) attended 3 or less prenatal consultations [9].

EMBRIOLOGY

The human central nervous system (CNS) is formed by two processes called primary and secondary neurulation. In the primary, the CNS develops from a thickened zone of the embryonic ectoderm, called the neural plate that appears from day 18 of gestation, in the trilaminar embryo period, as a response to induction by the notochord and the surrounding ectoderm [10]. Around the 18th day of embryonic development, the neural plate invaginates along the longitudinal axis of the embryo, forming the neural groove with the respective neural folds, which towards the end of the third week begin to fuse, said fusion is carried out. carried out irregularly from the area that will be the junction of the brain stem with the spinal cord and later in a cranial and caudal direction simultaneously, to finally generate the neural tube (NT) between days 22 and 23. From this structure will give rise to the brain, coming from the two cranial thirds of the NT, and the spinal cord, corresponding to the caudal third of the tube. Thus, it is important to emphasize this irregular closure, since during this period the NT is open at both ends allowing free communication with the ambiotic cavity. In this way, the cranial neuropore and the caudal neuropore are formed, which close approximately on days 25 and 27 respectively, being from the defective closure of the rostral neuropore from which most of the congenital malformations of the brain originate, while that

most congenital malformations of the spinal cord occur as a result of defects in the closure of the caudal neuropore [11].

In this way, the most accepted theory regarding the closure of the neural tube is the aforementioned, which starts from the midpoint and is conducted bidirectionally in the caudal and cephalad directions simultaneously. However, evidence has recently been presented for the presence of multiple closure sites along the neural tube. This has given rise to new theories and classification proposals based on the sites where the cellular and tissue adhesion mechanisms failed [11, 12].

In secondary neurulation, the condensation of the population of cells derived from the tail bud of the embryo forms an epithelial rod that undergoes channeling. Malformations that occur during secondary neurulation are covered by skin and often involve the cord tethered with associated lipomatous material [12].

THE NEURAL TUBE DEFECTS (NTDs)

During normal embryogenesis, the central nervous system originates from the neural tube, which forms from the ectoderm through primary and secondary neurulation, late in the third week and extends through the eighth week. Two theories explain the closure of the neural tube, the first one, of the zipper, which states that the closure begins in the region of the future neck and extends continuously in a rostral and caudal direction; and the second, the multisite, simultaneous, segmental and independent molecular regulation closure, the most accepted [13].

Traditionally it has been accepted that the embryogenesis of NTDs lies in neurulation failures, however, detailed analyzes indicate abnormalities in gastrulation, so vulnerability extends from the third to the eighth week, maximum third and fourth [13].

Like congenital heart disease, most NTDs are multifactorial in cause [13]:

1. Genetic causes [13]:

The main genetic factor is the mutation of the gene located on the short arm of chromosome 1 (1p36.3), encoding the enzyme methyltetrahydrofolate reductase, whose function is to allow folate to reach its active form.

2. Environmental causes [13]:

- Nutritional factors: folic acid deficiency and obesity.
- Physical factors: radiation, exposure to electromagnetic fields and hyperthermia.
- Chemical factors: drugs (folic acid antagonists, antiepileptics, retinoic acid), exposure to lead, glycoethers, organic solvents, gases anesthetics, mercury, antiseptics, alcohol, tobacco, coal smoke and biomass fuel.
- Seasonal Variations: seasonally changing environmental conditions influence the availability of certain nutrients, therefore seasonality is not directly a causal factor.
- Age of the parents: extreme maternal age and advanced paternal age.
- Obstetric history: multiparity, miscarriages and previous fetal deaths, short birth interval.
- Twins: the modality most frequently linked to multiple pregnancies is anencephaly.
- Non-infectious maternal diseases: diabetes mellitus and dysthyroidism.
- Others: stress, maternal residence close to landfills.

The embryogenesis of the defects is framed between the third and the twelfth week of prenatal development; the frequency of occurrence is high; the risk of recurrence depends on the cause, with an increase in genetic mutations and microdeletions, and the risk factors are diverse, and many are modifiable through the design and implementation of educational interventions in the community, which contributes to its more effective prevention: the preconceptional [13].

PREVENTION

NOM-007-SSA2-2016. For the care of women during pregnancy, childbirth and the puerperium, and of the newborn person

As part of the objective of this research is to prevent and know the measures that must be taken during pregnancy to avoid problems at birth and in the gestation of the baby, it is important to publicize NOM-007-SSA2-2016 for the care of the woman during pregnancy, childbirth and the puerperium and the newborn that provides the criteria and procedures for the provision of the service both in the medical area and in the recipient of the care provided, which allows the improvement of medical practice and care services of women during pregnancy, childbirth and the puerperium, as well as the care of the newborn, especially in terms of prenatal care, timely and quality care during childbirth and the care that newborns require in hospitals. first 28 days of life, in order to establish alternatives for better health development during the life of the mother and her daughters and sons; all this in order to provide health services through medical units to all pregnant women who present an obstetric emergency in order to reduce maternal and perinatal morbidity and mortality at the national level, which will be reflected in the corresponding indicators [14].

Therefore, maternal and child health constitutes a basic objective of the peoples because the biological and social reproduction of the human being rests on it; It is an essential condition for the well-being of families and constitutes a key element to reduce inequalities and poverty.

Within the norm, prenatal care is defined as: "the series of contacts, interviews or scheduled visits of the pregnant woman with health personnel, in order to monitor the evolution of the pregnancy and obtain adequate preparation for childbirth, the puerperium and the management of the newborn. Prenatal care includes the promotion of information on the normal evolution of pregnancy and childbirth, as well as on the symptoms of obstetric urgency; the right of women to receive dignified, quality care, with cultural relevance and respect for their autonomy; in addition to preparing a safety plan for women to identify the establishment for decisive medical attention where they should receive immediate attention..." [14].

It is vital to know that attention must be comprehensive and focused on considering human reproduction as an expression of reproductive rights, so that it is freely chosen and safe; promoting co-responsibility in the health care of the woman, her partner, the community and health personnel and systematically informing about the advantages of achieving a minimum interpregnancy interval of 2 years, to reduce long-term risks and adequately plan the family [14].

Thus, multiple sections of the norm are fundamental among them, there is section 5.1.9 of general provisions mentioning that: "Any woman of reproductive age who wishes to become pregnant, should preferably go accompanied by her partner to the establishment for medical attention, for medical advice on reproductive risk, ideally three months before attempting pregnancy. In this period it is important to start folic acid supplementation for the prevention of neural tube defects and continue it during pregnancy." [14].

Likewise, section 5.2.1.13 of general provisions mentions that: "To prevent neural tube defects, it is important to prescribe 0.4 mg of folic acid and micronutrients from the period, at least three months prior to the first consultation and throughout the pregnancy. " [14].

Section 5.2.1.15 establishes that it is necessary to: "Promote that low-risk pregnant women receive at least five prenatal consultations, preferably starting in the first 8 weeks of gestation and/or a positive pregnancy test, attending to the following calendar of visits:

- 1st: between 6-8 weeks;
- 2nd: between 10-13.6 weeks;

- 3rd: between 16-18 weeks;
- 4th: 22 weeks;
- 5th: 28 weeks;
- 6th: 32 weeks;
- 7th: 36 weeks; and
- 8th: between 38-41 weeks.

The importance of prenatal care with comprehensive and preventive interventions makes it possible to detect fetal and maternal risks, being able to apply timely prenatal screening between 11 and 13.6 weeks, and during the second trimester from 16 to 22 weeks, where ultrasound is a fundamental means of surveillance" [14].

Finally, section 5.2.1.16 of the general provisions mentions that it is essential: "To promote the performance of an obstetric ultrasound in each trimester of pregnancy by trained personnel, to intentionally determine maternal and fetal well-being. The first between weeks 11 to 13.6, through which the vitality, gestational age and number of fetuses that are being gestated are established; the second between 18 and 22 weeks and the third, between 29 and 30 weeks or more of gestation." [14].

Primary prevention of neural tube closure defects

Human morbidity and mortality in recent years has become an increasingly important issue, which is why during the first year congenital malformations and genetic diseases have become increasingly relevant, it is for this reason that primary prevention is essential to reduce the incidence of these pathologies.

Primary prevention focuses actions on healthy individuals and prevents the disease by reducing susceptibility or exposure to risk factors, which means that it is mainly preconception and prevents birth defects [15].

The Latin American Collaborative Study of Congenital Malformation has identified 10 risk factors to consider in developing countries: unplanned pregnancy, advanced maternal age, poor prenatal care, rubella, self-medication, alcohol, tobacco, dietary deficiencies, occupational exposure and lack of specialized consultation [15].

Other factors that should be considered in the primary prevention of birth defects are [15]:

- Occupation of the mother: Women who work outside the home undoubtedly have a higher reproductive risk; occupational exposure to lead and its association with mental retardation is the only proven teratogenic one.
- Environment: Pollution and accidents. Women of childbearing age must protect themselves from ionizing radiation, methylmercury and lead.
- Radiation and other physical factors: The perception of the risk of ionizing radiation is exaggerated. In usual doses they would not cause harm.
- Lifestyle: Tobacco, which causes intrauterine growth retardation, alcohol, which is the most frequent teratogen in our population and which is responsible for fetal alcohol syndrome. Drugs such as cocaine, which due to its vasoconstrictor effect, produce disruption-type malformations (gastroschisis, bladder exstrophy, etc.).
- A varied diet rich in fruits and vegetables is recommended; achieve an adequate weight for the pre-conception mother, since both low weight and obesity have been associated with pregnancy pathologies, IUGR, chronic diseases and congenital defects; indicate the use of preconception folic acid; avoid excessive consumption of vitamins, especially Vitamin A; avoid chemical and microbiological contamination of food (heavy metals: lead, cadmium, mercury, arsenic; pesticides (organochlorines); microorganisms: listeria, toxoplasma).
- Medications: The main problem is self-medication. It should be considered that all medications are potentially

teratogenic and that among these anticonvulsants, hormones, coumarins, antineoplastics, thalidomide, are the most important.

- Maternal communicable diseases: The most important to consider, either due to their frequency or the severity of their manifestations are: rubella, toxoplasmosis, chicken pox, HIV.
- Maternal non-communicable diseases: The most important thing is prenatal and ideally preconception control that allows adequate management of chronic diseases such as Diabetes Mellitus, Epilepsy, Arterial Hypertension.
- Maternal age and other demographic factors: Advanced maternal age is a risk factor for nondisjunction type chromosomal abnormalities; advanced paternal age favors new mutations of dominant conditions; consanguinity favors the appearance of recessive conditions, as occurs in areas of geographical isolation.

It has been shown in multiple controlled, randomized and observational studies that the consumption of adequate doses of folic acid during the periconceptional period reduces the risk of appearance and recurrence of children with neural tube defects. It is currently accepted that the periconceptional use of folic acid reduces the occurrence and recurrence of NTDs by around 70% [16-18].

Folic acid is involved in DNA synthesis and is therefore essential for the rapid cell division that occurs during early fetal development. It also plays an important role in methylation and thus in gene regulation and not only decreases the occurrence and recurrence of NTDs but also other congenital malformations such as cleft lip and palate, some malformations of the genitourinary tract and conotruncal heart defects, among others [16-18].

Translating this recommendation into practice has meant an important public health challenge because adherence to these indications has been very poor. The accepted strategies to increase the consumption of folic acid are the usual ones [15]:

1. Promote the consumption of foods rich in folic acid.
2. Promote the use of multivitamins with folic acid (supplementation) and
3. Fortification of foods for mass consumption.

Folic acid

Folic acid is a water-soluble vitamin of group B. It is considered an essential nutrient, which means that humans are not capable of synthesizing it. The only sources of folates are the diet and synthesis from some intestinal bacteria. It is found mainly in green leafy vegetables, liver and kidney. Folic acid deficiency is one of the most frequent. The main causes of deficiency are inadequate intake or absorption problems and the interference produced by drugs such as methotrexate and some anticonvulsants. Another important cause of deficiency is pregnancy as the developing fetus rapidly consumes maternal stores of folic acid [19].

At present it is known that marginal deficiencies or alterations in its metabolism are associated with other frequent pathologies such as congenital malformations and cardiovascular diseases. Folates mainly have two important physiological effects: they are a cofactor for enzymes that synthesize DNA and RNA, and they are required for the conversion of homocysteine to methionine. During early fetal development, nucleic acid and protein synthesis is at its highest level, and maternal folate requirements increase rapidly during this period. When the folate level is insufficient, the synthesis of nucleic acids is inhibited and the cells are not able to produce enough DNA for mitosis. In addition, as a result of the inhibition of the methylation cycle, there is an inability to methylate proteins, lipids, and myelin. For this reason, it plays a fundamental role in the prevention of neural tube closure defects [19].

Multiple investigations have shown that taking a 4-mg dose, beginning at least one month before conception and during the first trimester in women with a history of NTD offspring, reduces the risk of having another affected pregnancy by 70%. % approximately. This form of administration of the drug is important since most NTDs appear long before the woman finds out that she is pregnant. The AF also fulfills other functions [20-22]:

- In the production of red blood cells, since their deficiency can cause a type of megaloblastic anemia.
- It allows the rapid growth of the placenta and the fetus, associating its deficiency with placenta previa.
- It is needed to make new deoxyribonucleic acid (DNA) as cells multiply.
- Recent studies suggest that it prevents heart disease and cerebrovascular accidents.
- Helps prevent certain malignant processes, especially colon cancer.

Food fortification

NTDs have been associated with folate deficiency, the causes of which are: a) inadequate intake; b) poor absorption; c) increased consumption; and d) alterations in its use [16, 17, 23].

In addition to an insufficient diet, there are other situations that favor folate deficiency: alcoholism, intestinal diseases and drug interactions. As a preventive measure of NTDs, food fortification is an optimal way of use, hence the importance of fortifying wheat flour with folic acid to prevent them [23].

Folate is considered an essential nutrient, which is why some experts believe that the success of primary prevention will only be possible through the fortification of foods for mass consumption, which offers the advantage of covering a large population at a low cost, without requiring changes in the eating behavior of the population. In the Americas, wheat flour, corn flour, or both are foods of general consumption and excellent vehicles for fortification with iron, folic acid, B vitamins, and other nutrients [16, 17, 23].

In 1996, the Food & Drug Administration in the United States determined that all cereals should be fortified with folic acid and, since January 1998, fortification of flour for baking with folic acid is mandatory with the goal of achieving consumption of 100 µg/day. The result of the monitoring of this implementation showed a reduction of between 20 and 30% of the national rates of NTDs [23].

The woman who plans to become pregnant must consume folic acid at least four weeks before conception, however, more than half of pregnancies are not planned; consequently, it is necessary that 400 micrograms (µg) of folic acid be included in the diet of all women of childbearing age and, in the event that the woman has not added folic acid to her diet before conception, she should start taking it immediately after confirming the pregnancy, to favor the development of the embryo [23].

Interpregnancy period

It is a primary issue in the planning of pregnancies subsequent to deliveries, caesarean sections, and abortions. All couples are advised to wait two to three years to conceive a new pregnancy. The interpregnancy period is considered an important factor in the outcome of live newborns. It is a highly relevant issue, since the internatal period or birth interval is a risk factor for important adverse obstetric events. According to World Health Organization (WHO), the interpregnancy period is considered to be that between the date of the last obstetric event and the beginning (date of last menstruation) of the following pregnancy. The obstetric event can be an abortion or delivery (vaginal or by cesarean section) [24, 25].

It has been reported that there is an increase in maternal-fetal risk in relation to the duration of the intergenic period. However, it is important to emphasize that after a live birth, the recommended waiting time for the start of the

next pregnancy is at least 18 months (according to the WHO, the optimal time is 18-27 months) and no more than 60 months, to reduce the risk of maternal, perinatal and neonatal adverse events. Therefore, the short interpregnancy period is considered to be less than 18 months and the long interpregnancy period is considered to be greater than 60 months [24, 25].

It is important to emphasize that the path of resolution of the obstetric event may modify the number of months needed to increase the risk of adverse obstetric events in the subsequent pregnancy; The suggested time to start the next pregnancy after a vaginal or cesarean delivery is at least 18 months, while the period after an abortion is 6 months [24].

The risks that arise before a short or long interpregnancy period are divided into maternal, perinatal, neonatal and post-abortion. The importance of this issue lies in taking this interpregnancy period as a modifiable risk factor to avoid adverse obstetric events. The risk of presenting different complications increases depending on the elapsed interpregnancy period, whether it is 3, 6, 9, 12 or 18 months, for example, prematurity, uterine rupture, low birth weight, intrauterine growth restriction and death are related to interpregnancy period less than 18 months, while abortion, premature rupture of membranes, anemia and puerperal endometritis are related to interpregnancy period less than 6 months. It is also important to mention that a interpregnancy period less than 6 months increases the risk of preterm delivery by 40%, 60% for low birth weight, 14% for congenital malformations and 25% for small fetuses for gestational age. This may be due to a decreased folate reserve (maternal depletion hypothesis), continuous presence of systemic inflammatory response markers, maternal anemia, and lack of hormonal regulation [24].

Birth control

Prenatal control is important even in healthy pregnancies. Regular check-ups help identify patients with increased obstetric and perinatal risk, add interventions linked to the prevention of said risks, and also contribute to promoting healthy behaviors during pregnancy. Although it is not possible to obtain randomized scientific studies, the results suggest that children born to mothers without pregnancy checkups have three times more risk of being born with low weight and five times more chance of dying, compared to children of mothers who receive prenatal care. . In addition to medical care, prenatal care should include education, emotional support, and preparation for childbirth. The main objective of antenatal care is to achieve a pregnancy with a normal evolution, which ends with a healthy mother and newborn. Couples who schedule their pregnancies are more likely to reduce their risks, and on the contrary, couples who do not plan their pregnancies suffer the negative consequences of many behaviors, which lead to early pregnancy and damage to the fetus [26].

The objectives of prenatal control are [26]:

1. Assess the state of health of the mother and the fetus
2. Establish the Gestational Age
3. Evaluate possible risks and correct them
4. Plan prenatal check-ups
5. Indicate folic acid as soon as possible, for the prevention of neural tube defects.

The recommended frequency for an uncomplicated pregnancy is [26]:

- Every 4 weeks for the first 28 weeks
- Every 2-3 weeks between week 28 to week 36
- Weekly after 36 weeks

REGIONAL HOSPITAL "DR. RAFAEL PASCACIO GAMBOA"

The hospital today known to all as “Dr. Rafael Pascacio Gamboa” began his duty on September 15, 1899 under the name of “Casa de la Caridad”, under the baton of Dr. Domingo Chanona Rodríguez. It took 63 years for the place to be dignified, the building was renamed the Regional Hospital “Dr. Rafael Pascacio

Gamboa". Currently in this hospital approximately 800 babies are born per month and it is considered a comprehensive hospital for mother and child due to its timely and decisive care [27, 28].

It is considered an icon in maternal and child care in the state of Chiapas, it cares for children under 28 days old; approximately 15 to 20 babies are born each day. In the last year, this hospital attended more than 7,000 births, performed more than 10,000 surgical procedures including surgeries, cesarean sections and deliveries, and offered close to 35,000 consultations, which reaffirms the commitment to care for the mother-child pair and the various services offered such as HIV-AIDS care, vaccination, sexual and reproductive health actions, among others [27, 28].

METHODOLOGY

A retrospective, observational, cross-sectional, descriptive study was carried out, with secondary data obtained through databases and medical records of the Regional Hospital "Dr. Rafael Pascacio Gamboa", in the period from July 2022 to December 2022.

Data about the incidence of neural tube defects: Myelomeningocele reported in said period, which corresponded to 4 cases, were included

RESULTS

When analyzing the data obtained from the 4 clinical cases, it was possible to observe the presence of a pattern of coincidences in the cases that indicate possible risk factors for the appearance of this defect, as can be seen in *Table 1*, the four cases were male newborns, from parents with low level of education (secondary or less) and low socioeconomic level, from rural areas (Simojovel, Ocosingo, Ixtapa and Huixtiupan), likewise, risk factors were observed such as low number of prenatal check-up visits, with the maximum nine presented corresponding to the second case, while in the fourth case the parents did not attend any prenatal consultation, regarding this, the WHO recommends having antenatal care with a minimum of eight contacts can reduce perinatal deaths by up to 8 per 1,000 births, compared to a minimum of four visits.

Regarding the consumption of folic acid, it was observed that in the first case the mother did not consume folic acid, while in the second case the consumption of folic acid was established in the first trimester, in cases three and four began consumption after the first trimester of pregnancy, on this the Centers for Disease Control and Prevention recommends that women take 400 µg of folic acid every day, starting at least one month before becoming pregnant. Consuming the correct dose of folic acid during pregnancy will help prevent malformations of the central nervous system.

These factors probably greatly influenced the appearance of this defect since they are vital in embryonic development and in the evolution of pregnancy, their proper management leads to a healthy pregnancy, as well as indirect causes such as education, school level, family planning, sexual education, and the educational level that the parents have can affect family health directly or indirectly.

As well as possible determining factors that alleviate or aggravate the situation can be: the type of food, and/or the information that is

Tabla 1. Incidence of myelomeningocele

Cases	Birth control (no. of consults)	Other pregnancies before	Age	School level	Economic level	Gender
Case 1	6	Yes	Adult	Deficient	Low	Male
Case 1	9	Yes	Adult	Deficient	Low	Male
Case 3	5	Yes	Adult	Deficient	Low	Male
Case 4	0	Yes	Adult	Deficient	Low	Male

Nota: Para el diagnóstico es necesario tener HTA sistólica (≥ 140 mmHg), Grave (≥ 160 mmHg) y crisis hipertensiva

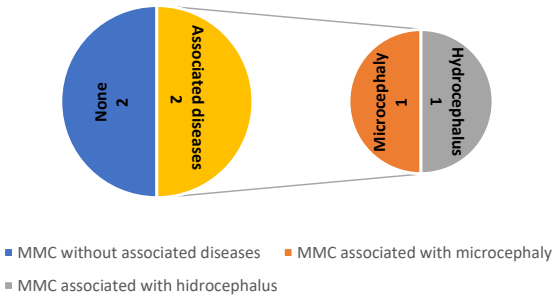
Source: Own elaboration (2022). Data obtained from the medical records of cases of neural tube defects at the Dr. Rafael Pascacio Gamboa General Hospital. Tuxtla Gutierrez, Chiapas.

available when regarding these cases, prenatal control is vital for a good pregnancy without complications and defects, as possible ideologies in this regard due to uses and customs of the localities that play an important role when making decisions about the health of patients and the handling that the doctor can have on this. And the nearby health centers or "local healers and/or midwives" who know how to handle these types of cases, as well as their dissemination and awareness to the general public, as a preventive measure.

All these scenarios influence the final outcome of the pregnancy

In addition to the aforementioned, the presence of associated diseases was observed in 2 of the 4 cases studied, one presented association with hydrocephalus and the second with microcephaly, as shown in *Figure 1*.

Figure 1. Cases of myelomeningocele with associated diseases.



Source: Own elaboration (2022). Data obtained from the medical records of cases of neural tube defects at the Dr. Rafael Pascacio Gamboa General Hospital. Tuxtla Gutierrez, Chiapas.

CONCLUSIONS

The data collected shows 4 cases of myelomeningocele at the Pascasio Gamboa Regional Hospital during 2022, an investigation that was followed in detail for its representation in the investigation "Myelomeningocele congenital malformation" to December 2022. The people involved are from economically unfavorable regions, with scarce economic resources living in areas such as: Simojovel, Ocosingo, Ixtapa and Huixtiupan. Most of them or one of their parents have little schooling up to primary or secondary, and most work in the fields without social security. As well as the type of diet, environment and care during pregnancy, everything created a series of decisive factors for the appearance of this defect, where folic acid, information prior to and during pregnancy, multiple pregnancies, the intergenic period, prenatal control, level educational and socioeconomic and the role The role played by ideology, since the majority comes from an indigenous community, makes the work of health personnel or the nearest health center more precarious and/or difficult to carry out.

However, the spread of these cases, and the possible causes that can lead to the appearance of this defect, as well as those that can prevent it, are reason enough for every parent or person about to enter family planning to know, with the objective of To provide dissemination and prevention to future families, this research concludes that: folic acid, prenatal control, and education as well as information play a vital role in the appearance of neural tube defects such as myelomeningocele.

REFERENCIAS

1. Alruwaili AA, Das JM. Myelomeningocele [Internet]. StatPearls - NCBI Bookshelf. 2022. Available from: https://www.ncbi.nlm.nih.gov/books/NBK546696/
2. Avagliano L, Massa V, George TM, Qureshy S, Bulfamante G, Finnell RH. Overview on Neural tube defects: from development to physical characteristics. Birth Defects Res [Internet]. 2019 Nov 15;111(19):1455–67. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6511489/pdf/nihms-986149.pdf
3. Copp AJ, Adzick NS, Chitty LS, Fletcher JM, Holmbeck GN, Shaw GM. Spina Bifida. Nat Rev Dis Prim [Internet]. 2016 Jun 8;1:1–45. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4898641/pdf/emss-68524.pdf
4. Kumar V, Abbas A, Aster J. Patología humana.: Elsevier Health Sciences; 2008. 10th ed. Elsevier, editor. Madrid; 2018. 952 p.
5. Rama López R, Leis Trabazo MR, Somoza Argibay I. Influencia de la cirugía fetal del mielomeningocele en su pronóstico urológico: revisión sistemática. [Internet]. [Santiago de Compostela]: Universidad de Santiago de Compostela; 2021. Available from: https://minerva.usc.es/xmlui/bitstream/handle/10347/27993/2021_tfg_medicina_rama_influencia.pdf?sequence=1&isAllowed=y
6. Erazo Fonseca F, Eduardo Ortega J, Catarino Rivas M, Pedro Sula S. Mielomeningocele: actualización para la práctica clínica Myelomeningocele: update for clinical practice. Rev Med Hondur [Internet]. 2021;89(1):1–68. Available from: https://doi.org/10.5377/rmh.v89iSupl.1.12045
7. Casimiro-Soriguer Escofet FJ, Arena Ansotegui J, Orera Clemente M, Rodríguez Rozalén MÁ, Bailón Muñoz E, Gallo Vallejo M. Guía para la prevención de defectos congénitos [Internet]. Ministerio de Sanidad y Consumo, editor. Madrid: Ministerio de Sanidad y Consumo; 2006. 1–97 p. Available from: https://www.sanidad.gob.es/profesionales/prestacionesSanitarias/publicaciones/docs/GuiaPrevencionDDCC.pdf

8. de Santos Hernández S, Madrigal Fernández MÁ. Espina bífida: prevención y abordaje actual de este trastorno [Internet]. [Valladolid]: Universidad de Valladolid; 2016. Available from: https://uvadoc.uva.es/bitstream/handle/10324/17950/TFG-H497.pdf?sequence=1&isAllowed=y
9. García Camacho A, Campos Martínez JF, Bernal Vázquez E, Ledezma Ruvalcaba JC, Pérez Muñoz VM. Tendencia de los Defectos de Tubo Neural en el Estado de Hidalgo México del 2013-2018. J Negat no Posit results. 2020;5(11):1444–63.
10. Singh R, Munakomi S. Embryology, Neural Tube. StatPearls [Internet]. 2022 May 8; Available from: https://www.ncbi.nlm.nih.gov/books/NBK542285/
11. Perelmuter R, De Marco L. Feto anancefálico: Presentación de un caso de autopsia fetal y revisión bibliográfica. La Habana: Morfovirtual; 2014. p. 7.
12. Pérez Da Rosa SI, Smith Fernández VM. Tratamiento Neuroquirúrgico de los defectos del cierre del tubo neural [Internet]. [Malaga]: Universidad de Málaga; 2017. Available from: http://orcid.org/0000-0002-4480-0945
13. Martínez Leyva G, Blanco Pereira ME, Rodríguez Acosta Y, Enríquez Domínguez L, Marrero Delgado I. De la embriogénesis a la prevención de cardiopatías congénitas, defectos del tubo neural y de pared abdominal. Rev Médica Electrónica [Internet]. 2016;38(2):239–50. Available from: http://www.revmedicaelectronica.sld.cu/index.php/rme/article/view/2956/1717
14. Secretaría de Salud. NORMA Oficial Mexicana NOM-007-SSA2-2016, Para la atención de la mujer durante el embarazo, parto y puerperio, y de la persona recién nacida. [Internet]. Diario Oficial de la Federación, NOM-007-SSA2-2016 Apr 7, 2016. Available from: https://www.dof.gob.mx/nota_detalle.php?codigo=5432289&fecha=07/04/2016#gsc.tab=0
15. Cortés FM. Prevención primaria de los defectos de cierre del tubo neural. Rev Chil pediatría [Internet]. 2003 Jan 1;74(2):208–12. Available from: http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0370-41062003000200011&lng=es&nrm=iso&tlng=es
16. Hernández Ugalde F, Martínez Leyva G, Rodríguez Acosta Y, Hernández Suárez D, Pérez García A, Almeida Campos S. Ácido fólico y embarazo, ¿beneficio o riesgo? Rev Médica Electrónica [Internet]. 2019;41(1):142–55. Available from: http://scielo.sld.cu/pdf/rme/v41n1/1684-1824-rme-41-01-142.pdf
17. González González AI, Carballo García M. Ma. Ácido fólico y defectos del tubo neural en Atención Primaria. Rev Med Fam y Comunitaria [Internet]. 2003 Apr;13(4):305–10. Available from: https://scielo.isciii.es/pdf/medif/v13n4/hablemos.pdf
18. NacerSano. Defectos del tubo neural [Internet]. MarchOfDimes. 2022. Available from: https://nacersano.marchofdimes.org/complicaciones/defectos-del-tubo-neural.aspx
19. Cortés M F, Hirsch B S, de la Maza C MP. Importancia del ácido fólico en la medicina actual. Rev Med Chil [Internet]. 2000 Feb;128(2):213–20. Available from: http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0034-98872000000200013&lng=es&nrm=iso&tlng=es
20. National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention. Folic Acid: The Best Tool to Prevent Neural Tube Defects | CDC [Internet]. Centers for Disease Control and Prevention. 2022. Available from: https://www.cdc.gov/ncbddd/folicacid/features/folic-acid-helps-prevent-some-birth-defects.html
21. Lardoeyt Ferrer R, Taboada Lugo N, Torres Sánchez Y, Viñas Portilla C. Fundamentos del ácido fólico en la prevención primaria farmacológica de defectos congénitos. Rev Cuba Med Gen Integr [Internet]. 2005;21(1–2). Available from: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-21252005000100016
22. Longo-Araújo de Melo E, Castelo-Branco Araújo A, Silveira-Carrara G, Nakayama M, Fernandes-Távora D. Anormalidades del sistema nervioso central y alteraciones de los miembros superiores en pacientes con mielomeningocele. Rev Neurol [Internet]. 2008;46(9):525–30. Available from: https://neurologia.com/articulo/2007406
23. Rojas Hernán A S, Tarqui-Mamani C, Villanueva Coz V. Importancia de fortificar la harina de trigo con ácido fólico para prevenir defectos del tubo neural en Perú Importance of fortifying wheat flour with folic acid to prevent neural tube defects in Peru. Rev Enfermería Hered [Internet]. 2009;2(2):105–12. Available from: https://faenf.cayetano.edu.pe/images/pdf/Revistas/2009/febrero/acido folico.pdf
24. Zavala-García A, Ortiz-Reyes H, Salomon-Kuri J, Padilla-Amigo C, Preciado Ruiz R. Articulo de Revisión. Periodo intergenésico: Revisión de la literature. Rev Chil Obstet Ginecol [Internet]. 2018;83(1):52–61. Available from: https://www.scielo.cl/pdf/rchog/v83n1/0048-766X-rchog-83-01-0052.pdf
25. World Health Organization. Report of a WHO Technical Consultation on Birth Spacing. Geneva; 2007.
26. Aguilera P S, Soothill P. Control prenatal. Rev Médica Clínica Las Condes [Internet]. 2014;25(6):880–6. Available from: https://www.clinicalascondes.cl/Dev_CLC/media/Imagenes/PDF revista médica/2014/6 Nov/06-aguilera.pdf
27. Alerta Chiapas. Cumplió 120 años del Hospital Regional de Tuxtla [Internet]. AlertaChiapas.com. 2019. Available from: https://alertachiapas.com/2019/09/17/cumplio-120-anos-del-hospital-regional-de-tuxtla/
28. Cintalapanecos.com. Hospital "Pascacio Gamboa", ícono en la atención materno-infantil [Internet]. Cintalapanecos.com | Noticias. 2020. Available from: https://www.cintalapanecos.com/hospital-pascacio-gamboa-icono-en-la-atencion-materno-infantil/

Citar como: Aceituno Ovando, G; Jiménez Ocaña, MR; Myelomeningocele a congenital disease in Chiapas. *AMU*. 2023;2(1):32-43. Doi: 10.31644/AMU.V02.N01.2023.A04