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ENCEPHALOCELE AND RECONSTRUCTIVE SURGERY A SYSTEMATIC REVIEW

Wahab Moustafa[1], Imesha Kalansuriya[2], Ali Hassan[3], Tariq Rafique[4*], Mohit Lakkimsetti[5], Laraib Ahmed[6], Mohamad Kinan Sultan[7], Salah Maksoud[8]

[1]Mr, Department of Spine Surgery and Neurotrauma Unit, SRH Waldklinikum Gera, Germany
[2]Medical Student, Medical University of the Americas, St. Kitts and Nevis
[3]Specialty Registrar, Department of Burns & Plastic Surgery, University Hospital Birmingham NHS Trust, United Kingdom
[4*]Assistant Professor, Dadabhoy Institute of Higher Education, Karachi, Pakistan
[5]MBBS, Mamata Medical College, Khammam, India
[6]Doctor, Department of Surgery, Dr. Ziauddin Hospital, Karachi, Pakistan
[7]Mr, Department of Spine Surgery and Neurotrauma Unit, SRH Waldklinikum Gera, Germany
[8]Mr, Klinik für Neurochirurgie, Klinikum Darmstadt, Germany

***Corresponding Author:** Tariq Rafique
*Assistant Professor, Dadabhoy Institute of Higher Education, Karachi, Pakistan
Email: dr.tariq1106@gmail.com

ABSTRACT:

Introduction: Congenital deformities, or neural tube closure abnormalities, result from erroneous or incomplete neural tube closure during embryonic development. Encephalocele, a rare congenital central nervous system defect, occurs in approximately 1 in 5,000 live births. Folic acid deficiency is a significant risk factor and has a similar influence on the emergence of spina bifida and anencephaly. Encephalocele can occur independently or with other deformities, such as microcephaly, holoprosencephaly, hydrocephalus, and myelomeningocele.

Methodology: A systematic literature review was conducted by consulting the SciELO (Scientific Electronic Library Online) and PubMed databases from February to September 2022. The inclusion criteria required articles written in English, published between 2011 and 2022, and containing at least two relevant keywords.

Results: The analysis included one case series, eight clinical cases, and a retrospective observational cohort study involving 400 individuals. The discussion focused on the pathophysiology of encephalocele, its psychological impact, and reconstructive surgical approaches. The reviewed articles demonstrated that encephalocele and meningoencephalocele can be treated using various neurosurgical techniques.

Discussion: There is no universally ideal approach for treating encephalocele; each case requires careful and unique consideration. The involvement of a multidisciplinary team and a synergistic action plan between the plastic surgeon and neurosurgeon are essential for achieving the best outcomes.

Conclusion: A multidisciplinary approach is critical for optimal treatment outcomes in encephalocele cases. Further research is needed to refine and improve treatment strategies.

KEYWORDS: Plastic Surgery; Reconstructive Surgical Procedures; Encephalocele; Neurosurgery.

INTRODUCTION:

Neural tube closure defects (NTCDs) are congenital abnormalities that arise from an incomplete or faulty neural tube closure during embryonic development. They have been linked to spina bifida, encephalocele, and anencephaly. Malformations such as meningoencephalocele and encephalocele are virtually equally prevalent in men and women, with a bit of female bias. A defect in the skullcap causes the brain and meninges to herniate in the encephalocele. During the first three weeks of pregnancy, there is a problem causing the dorsal midline structures of the primitive neural tube to fuse. The occipital area is home to about 75% of encephaloceles (Alberts & Lucke-Wold, 2023; Langman et al., 2023).

Moreover, one instance of encephalocele, a rare congenital disability of the central nervous system, occurs for every 5,000 live births. Folic acid deficiency is the risk factor; it seems to have a similar influence on the emergence of spina bifida and anencephaly. Encephalocele can happen independently or in conjunction with other deformities, such as microcephaly, holoprosencephaly, hydrocephalus, and myelomeningocele. Currently, surgery is the only available treatment for encephalocele. The procedure involves resecting the hernia sac following dissection, flat repair, and dura mater hermetic closure. Neurosurgeons typically treat occipital encephaloceles (Jiang et al., 2024; A. Y. Li et al., 2024).

Neurosurgery is best performed by the plastic or craniofacial surgery team, as with prior encephaloceles. Low birth weight, massive brain herniation, significant abnormalities, hydrocephalus, and concurrent intracranial or extracranial malformations are the poorest prognosis factors for patients with encephalocele. Lastly, since reconstructive surgery for encephalocele is now the sole available treatment for this disorder, understanding it is crucial.

Table 1: Types and Prevalence of Neural Tube Closure Defects (NTCDs)

Type	Description	Prevalence	References
Spina Bifida	Incomplete closure of the spinal cord and vertebral column during embryonic development.	Common	Alberts & Lucke-Wold, 2023; Langman et al., 2023
Encephalocele	Herniation of the brain and meninges through a defect in the skullcap.	Rare (1 in 5,000 live births)	Jiang et al., 2024; A. Y. Li et al., 2024
Anencephaly	The absence of major portions of the brain, skull, and scalp is due to neural tube closure failure.	Rare	Alberts & Lucke-Wold, 2023; Langman et al., 2023

Table 2: Characteristics and Treatment of Encephalocele

Characteristic	Description	References
Location	Occipital region (75% of cases)	Alberts & Lucke-Wold, 2023; Langman et al., 2023
Risk Factors	Folic acid deficiency	Alberts & Lucke-Wold, 2023; Langman et al., 2023
Associated Conditions	Microcephaly, holoprosencephaly, hydrocephalus, myelomeningocele	Junior et al., 2024; Yindeedej et al., 2023
Treatment	Surgical resection of hernia sac, repair, dura mater closure	Jiang et al., 2024; A. Y. Li et al., 2024
Prognostic Factors	Low birth weight, severe brain herniation, concurrent abnormalities	Junior et al., 2024; Yindeedej et al., 2023

This study's primary goal is to comprehend the therapy of encephalocele, paying particular emphasis to the condition's pathogenesis, psychological effects, and reconstructive surgery (Junior et al., 2024; Yindeedej, Sungpapan, Duangprasert, & Noiphithak, 2023).

METHODOLOGY:

Using the SciELO (Scientific Electronic Library Online) and PubMed databases, a systematic review of the literature was conducted between February and September of 2022. It is appropriate to emphasize that the research was not required to be submitted to the Research Ethics Committee (CEP) because the research request is not feasible. We used the QUADAS (Quality Assessment of Diagnostic Accuracy Studies) methodology, based on the Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy recommendations, to examine the methodological quality of

the assembled studies. Together with the Boolean operators "AND" and "OR," the descriptors were those found in Mesh/Decs (Gallagher, Ray, & Gudis, 2023; Hussen & Gebremedhin, 2023).
The following keywords were utilized: "Plastic surgery," "Reconstructive surgical procedures," "encephalocele," and "Neurosurgery." The articles had to be written between 2011 and 2022 in English, have at least two keywords connected to the issue, and be fully readable. The exclusion criteria included partial studies, publications written in languages other than English, and articles that did not span the proposed period. Therefore, 314 articles were located in the databases consulted based on the abovementioned search strategy (Mansoor & Ameer, 2024).
However, only ten pieces were eligible for inclusion. In the meantime, the analysis and synthesis of the data gathered from the included articles were presented descriptively to compile the knowledge created regarding the subject examined in this review. This was done by creating a table with the critical details of the chosen articles in this systematic literature review, including the author, design used, number of patients, primary findings, and conclusions (Basheer, Raj, Mathew, & Alapatt, 2023).

RESULTS:

A case series, eight clinical cases, and a retrospective observational cohort research including 400 patients were all included in this analysis. Table 1 summarises the features of every study in this systematic literature evaluation. Additionally, a prism that correlates to Figure 1 was built for the search criteria and study selection to strengthen the validity of this review and make it easier for the reader to understand how the data extraction was done (Hamad et al., 2023; Z. Li et al., 2024).

AUTHOR	DESIGN	NUMBER OF PATIENTS INCLUDED	FINDINGS	CONCLUSION
Arifin, Bajamal, and Suryaningtyas (2018)	Retrospective observational cohort study	400	Most of the patients were younger than eighteen. When paired with the nasoorbital type, most frontoethmoidal encephaloceles (FEE) were nasoethmoidal. Sixty-four instances had intracranial anomalies, such as arachnoid cysts, porencephalic cysts, ventricular malformations, and ventricular enlargements. The primary issues linked to extracranial issues were ophthalmological. Using a transfacial technique in another unit, four patients experienced scarring from prior surgery as well as recurrence of the lump. The most common postoperative problems were wound dehiscence and cerebrospinal fluid leak, which in seven cases left an exposed implant or exposed bone graft. Three patients experienced progressive hydrocephalus, while five patients had benign intracranial hypertension. Twelve of the 22 patients had a distorted jawbone. Complete removal of the mass would have left thin skin in direct contact with the recessed jaw, which would have resulted in unacceptable aesthetic results (discoloration, hypertrophic scar, and persistent canthal dystopia). Instead, a small gliotic mass was left to help shape the jaw bone level and prevent skin discoloration.	Careful and precise technique is crucial to lower the complication rate, particularly when managing dural closure and choosing the appropriate method.
Prod'hom me et. al. (2021)	Case report	1	A 6-month-old boy who presented with a congenital frontoethmoidal encephalocele underwent surgery. The Chula approach was used due to the magnitude of the frontal mass; following the opening of the dura mater and the evacuation of the cerebrospinal fluid, the herniated brain tissue was moved to its physiological area. Using an autologous dural substitute taken from the galea aponeurosis via a bi-coronal incision that extended to the parietal bone region, the dura mater was closed with a continuous nonabsorbable suture. Transosseous stitches were used to attach an autologous parietal bone graft to the skull securely, and stability was verified. With staples, the bicoronal incision was sealed. The absorbable thread was used for facial reconstruction after extra skin was excised. The progression of the patient was unremarkable. Both the functional and aesthetic outcomes were satisfactory. His recovery went smoothly, and after two months of clinical observation, local healing was finished. The results of the neurological evaluation were average.	A single-stage, implant-free technique utilizing just autologous tissue proved successful in lowering the risk of infection. Even in the challenging circumstances found in a hospital in a low-income nation, such a technically complex reconstructive surgery can be completed with good clinical results, both functional and aesthetic, with the help of a well-trained and experienced multidisciplinary team and a sufficient radiological investigation.
Tan et al. (2020)	Clinical Case	1	Large occipital encephalocele in a newborn born at term was initially detected by prenatal ultrasonography at 17 weeks of gestation. The patient had occipital encephalocele correction on the second day of life. The lesion had a diameter of 7 cm and was fixed with a reverse scalp visor flap on the same day,	It took a comprehensive approach to guarantee the best possible result. A reverse-scope scalp flap may help fix full-thickness abnormalities in

			with no early postoperative problems. The neurosurgical team carried out the first portion of the procedure. The margins of the skin defect were removed, and the dural plane connecting the lesion's perimeter to its center was found. The pericranium was preserved after subgaleal dissection. The plastic surgery team carried out the second portion of the procedure. Based on the lateral blood supply of the scalp on both sides, a reverse visor flap was created. The donor area was healing, and the surgical repair was still closed at the patient's follow-up.	patients with encephalocele because it is a safe and successful method.
Parisi et. al. (2020)	Case report	1	The patient's female, full-term birth. She needed non-invasive ventilation for five minutes following her apnea at birth, but after that, her breathing started on its own. When she began having trouble eating in the days that followed, amniotic membrane deficiency was the first treatment option considered since it seems to promote epithelialization, speed up wound healing, and reduce the growth of bacteria. The right nostril's yellowish discharge, snoring, and inadequate development of allogeneic material were blamed for the failure of the first closure attempt. An MRI of the brain revealed a heterogeneous oval tumor inside the right nasal cavity, pushing the septum to the left and pedicle connected to the frontal lobe. The mass was evident inside the right nasal fossa. A cerebrospinal fluid leak via the right nostril started on the 28th day of life. The procedure involved isolating and resecting the neck of the endonasal tumor to remove it. Endoscopic repair of the defect using a previously produced amniotic membrane was considered for potential transcranial closure. Following surgery, the patient resumed normal breathing and eating patterns; nevertheless, the CSF leak returned on day 73 of life. A further endoscopic surgery was required due to the persistence of a minor bone defect in the right cribriform plate, as revealed by CT scan results. During the second procedure, a mixed bone/mucoperiosteum graft from the middle turbinate was used to close the gap. After eighteen months, her cerebrospinal fluid leakage stopped, and she was eating, breathing correctly, and growing appropriately. A late postoperative MRI revealed that the lesion had disappeared entirely. It was a stand-alone procedure for a baby who has a significant defect and a possible high-flow CSF leak. In certain instances, a complete endoscopic procedure can be used to treat basal encephaloceles in infants as well, preventing issues like meningoencephalic infection or development retardation brought on by nasal blockage.	The first option was the amniotic membrane, which promotes epithelialization, speeds up wound healing, and reduces the growth of microorganisms. Allogeneic material was insufficient as a stand-alone approach in a baby with a significant defect and a possible high-flow cerebrospinal fluid leak, which was the failure of the initial closure attempt. In certain instances, a complete endoscopic procedure can be used to treat basal encephaloceles in infants as well, preventing issues like meningoencephalic infection or development retardation brought on by nasal blockage.
Horcajadas; Palm; Khalon. (2018)	Case report	1	A premature female baby whose skin was intact but thin and had some exudation had a big frontal mass that occupied the upper part of the nasal cavity and the bottom part of the frontal area. There were no motor defects in terms of neurology. When the patient was seven months old, the procedure was carried out. A 3D skull model from a CT scan was created to plan the procedure. The oral and maxillofacial surgeon exposed the encephalocele via a lateral rhinotomy incision, and the encephalocele sac was circumferentially dissected to liberate it from the surrounding tissue. The dural sac was sutured after the dysfunctional brain tissue was removed. The pericranial flap and tachosil were employed to fill the space and strengthen the closure. Two full-thickness cortical block bone grafts were used from the parietal bone to repair the glabella and nasal bone. The remaining nasal bones were secured to the grafts using absorbable sutures. The frontal bone that had been craniotomized was replaced and stabilized. The skin flap covering the nasal cavity was altered. The surgical site was unharmed, there were no postoperative problems, and the patient's functional and cosmetic progress was satisfactory. The CSF was not leaked. The patient needed to have the shunt drained after developing an infection. Therapy with antibiotics and external ventilation.	Each case must be unique, and the surgical technique and timing must be carefully considered. Considerations such as the patient's age and weight, skin health, and hernia anatomy must be made when making decisions. Using a 3D model for surgical planning proved very beneficial in ensuring a sound reconstruction and preparation for surgery. Using a multidisciplinary approach is highly advised. Although no CSF leaks were discovered during the procedure, and the cosmetic outcome and closure were excellent, complications, particularly infections, are common.
Roehm et. al. (2018)	Case Series	6	Mastoidectomy, middle fossa craniotomy, or a combination of these procedures are typically used to treat temporal bone abnormalities affecting the tegmen tympani and mastoid that result in temporal lobe encephaloceles and cerebrospinal fluid otorrhea. Patients undergoing standard middle fossa craniotomy may experience dural retraction, which may result in neurological problems after surgery. The lateral skull base has been repaired using endoscopic and minimally invasive procedures that have been employed in previous surgeries to reduce brain retraction. This study aimed to investigate the potential for successful repair of tegmen abnormalities using endoscopic visualization obtained during a middle fossa	Keyhole craniotomy with endoscopic visibility and little retraction was used to treat all cases satisfactorily. The length of surgeries did not grow. These patients did not experience significant surgical problems, encephalocele recurrence, or otorrhea in the cerebrospinal fluid. During temporal and tegmen encephalocele surgery, endoscopic imaging permits fewer incisions and

			keyhole craniotomy. The authors retrospectively reviewed six examples of endoscopically assisted middle fossa repairs of tegmen dehiscences in a tertiary medical center over 18 months.	craniotomies with minimal risk of brain retraction injury without sacrificing the integrity of the repair.
Dzhambaz ov et. al. (2019)	Case report	1	We will discuss the case of a three-year-old girl who reported having a runny nose. For eating issues that start at five months of age and are permanent, the endoscopic endonasal technique can be a safe and successful therapeutic option. No rhinorrhea history existed. Preoperative magnetic resonance imaging showed that CEM extended from the cellar area to the nasopharynx via the non-pneumatized sphenoid sinus. With the use of an endonasal endoscopic technique, the lesion was excised. A second rhinoscopy verified there was no postoperative CSF leak.	Early childhood congenital transsphenoidal meningoencephalocele removal may benefit from the safe and efficient endoscopic endonasal technique.
Abdourafiq et. al. (2021)	Case report	1	A brain herniation known as an encephalocele develops during fetal development as a result of the neural tube's inadequate closure. Most occurrences of this uncommon cranial abnormality are found in the occipital bone. Extremely uncommon frontal encephaloceles might affect the orbits, nasal, or ethmoid bones. Due to its complexity, surgical repair frequently calls for a multidisciplinary team. Computed tomography was used to diagnose, revealing a defect in the frontoethmoidal region.	A conventional bi-coronal method was combined with the cranial approach. There were no problems during the follow-up after the deformity was excised, and the defect was fixed with an autologous parietal bone graft. The three main objectives of surgery are restoring normal anatomy, achieving a decent cosmetic repair, and stopping a cerebrospinal fluid leak. A literature review and a description of the case and surgical method are included.
Albano et. al. (2019)	Case report	1	A rare deformity called encephalocele is caused by the herniation of the brain's contents via a cranial defect. Transsphenoidal placement is rare; only 5% of basal encephaloceles have this position. Transsphenoidal encephalocele is a problematic surgical case. The best course of action is still debated and varies with surgical expertise. We present the results of a transsphenoidal encephalocele's surgical correction.	A sublabial transsphenoidal microsurgical (TSM) technique was used to repair the seller defect and encephalocele. Computed tomography (CT) and preoperative magnetic resonance imaging (MRI) were essential for surgical planning. The sac, as well as the bone defect, were well and completely exposed thanks to the sublabial transsphenoidal microsurgical technique. Following surgery, the bone defect was restored, and normal anatomy with herniated structures pushed back into the sea was recovered, according to postoperative CT and MRI images. The sublabial transsphenoidal microsurgical technique is a safe, minimally invasive procedure for treating transsphenoidal encephalocele.
Tan Shamaerao et al. (2022)	Case report	1	A herniation of the meninges and brain via a defect at the base of the skull is known as congenital meningoencephalocele. In addition to brain abnormalities, sensory deficits, neurological morbidities, poor nasal function, and a possible risk of intracranial infection, it can also cause vision impairment. Reconstruction of the skeletal and dermal structures, closure of the dura mater, and removal or relocation of nonfunctioning brain matter are among the objectives of surgery.	The case of a 4-month-old baby with frontoethmoidal encephalomingocele, a condition whose steady rise in volume was only detected after birth, is presented by the authors. Following departmental discussions, a two-stage surgical protocol was developed. The first stage involved the urgent removal or repositioning of nonfunctioning brain tissue, the closure of the dura mater, and skeleton reconstruction by the neurosurgeon and craniomaxillo facial surgeon; the plastic surgeon then performed the second stage to correct hard and soft tissue craniofacial deformities. Frontoethmoidal encephalomenin gocele requires challenging surgical techniques, particularly in young patients. Several departments must collaborate to create surgical plans to accomplish the ultimate surgical goal.

Table 1- Characteristics of the articles reviewed and used according to the author, a design used, number of patients, main results, and conclusions in the areas evaluated.

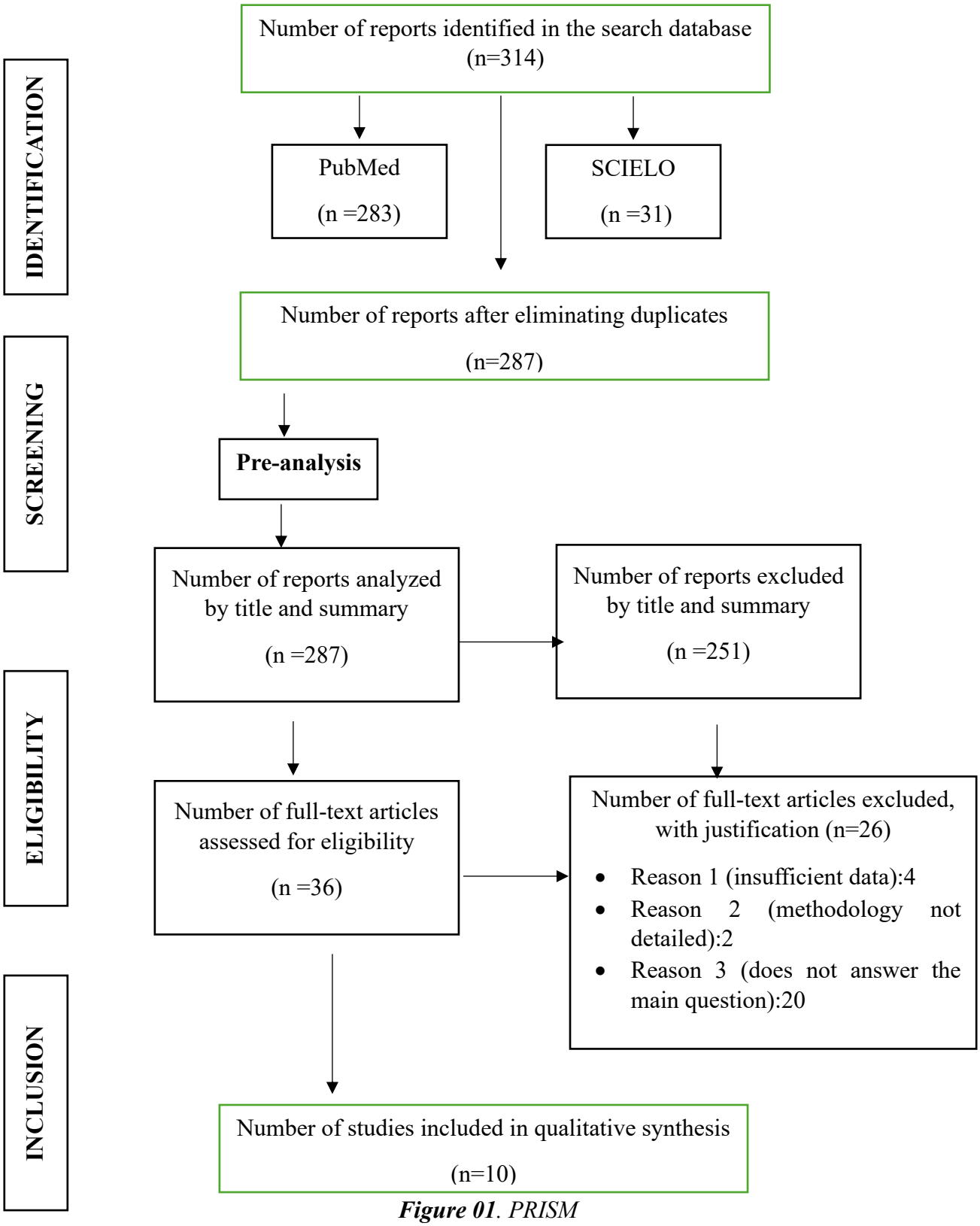

***Figure 01**. PRISM*

DISCUSSION:

PATHOPHYSIOLOGY:

Encephalocele is a congenital bone abnormality that develops during the fetus's nervous system's creation. During embryonic development, one of the primary flaws in the closure of the neural tube, the embryonic structure responsible for the creation of the central nervous system, is characterized by the herniation of the nerve tissue and meninges via a cranial vault defect. Figure 2 depicts the neural tube's development during embryonic life. This deformity results from bone abnormalities or,

in rare cases, from cerebral foramina. This causes the contents of the skull to protrude, which can result in hernias in various anatomical places (Alsallom, Alzahrany, Gonzalez-Martinez, & Jehi, 2024; Yamazaki et al., 2023).

Therefore, the following herniated areas are frequently classified: nasofrontal, naso-ethmoidal; naso-orbital, anterior ventricle; interfacial, storm; transethmoidal; transsphenoidal; spheno-orbital; fronto-ethmoidal encephalocele; and so on. The most common form is the occipital form. The contents of the herniated sac might vary. The first type is a cranial meningocele, in which the meninges are exposed and contain cerebrospinal fluid. Meningoencephalocele is the second classification, in which a portion of the brain (the cerebellum or brainstem) and the meninges carry the herniated contents. The last condition is meningohydroencephalocele, also known as hydroencephalocele, in which herniations are shown as ventricular system extensions close to the meninges and the brain (Méndez, Mena, Aguilar, Segura, & Guerrero, 2023; Pesce, Armocida, Petrella, Frati, & Pompucci, 2023).

Obstetric ultrasound is typically used to detect encephalocele during pregnancy; this test is instrumental between the eighteenth and twentieth week of pregnancy. To plan the surgical method to correct the fetal injury, a pediatric neurosurgeon and a plastic surgeon must closely watch the mother and fetus following diagnosis. Following delivery, they require ongoing treatment with a multidisciplinary support network. Surgical treatment aims to rectify deformities, prevent injuries, and improve appearance. A surgery's difficulty level might vary according to size, location, contents, and other visualization-related aspects. The interdisciplinary monitoring team can limit consequences, such as mild to severe neurological abnormalities (Elmaghrabi, Arab, El Awady, & Mourad, 2023; Robillard, Galatas, & Mehta, 2024).

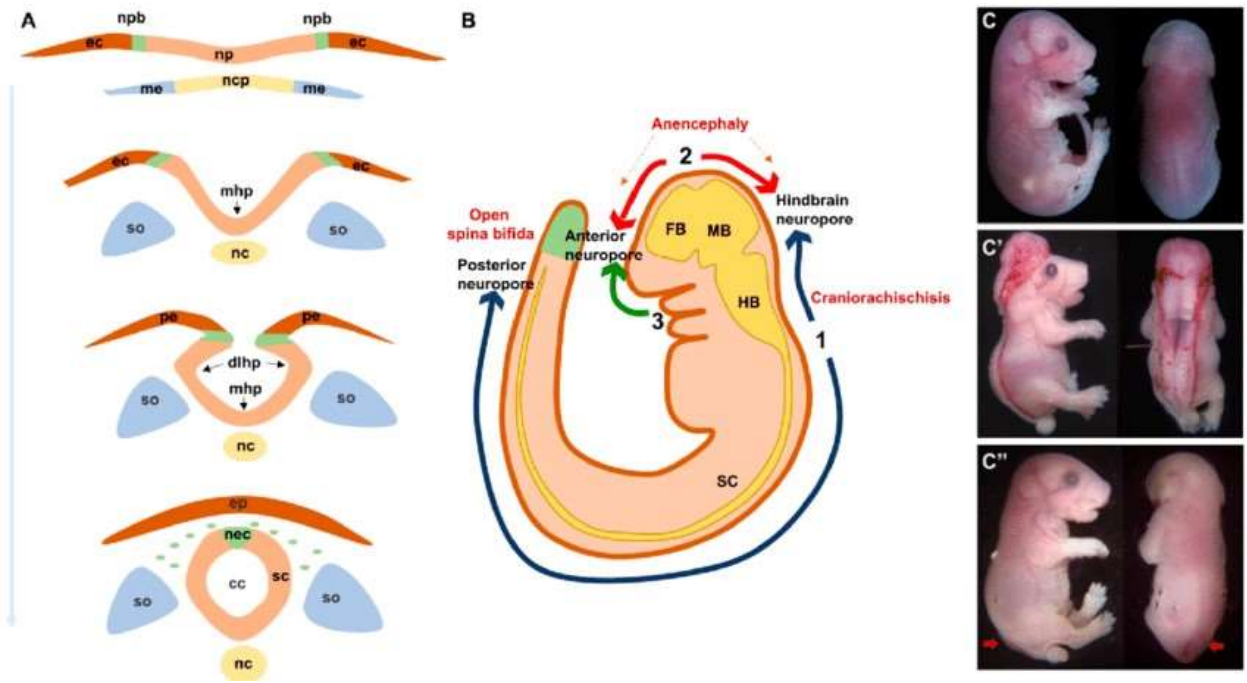

Figure 2: Neural tube development

PSYCHOLOGICAL REPERCUSSION OF THE ENCEPHALOCELE:

In most cases, in addition to the neurological deficit brought on by the protrusion of the nervous tissue, certain limitations and abnormalities (both motor and cognitive) are observed due to the multifactorial abnormality of the neural tube closure. Consequently, because of the protrusion of the brain material, the urgently needed treatment entails surgical correction by a plastic surgeon and a neurosurgeon for cranial and aesthetic repair. Thus, we recognize the significance of cranial reconstruction, which can be accomplished by either autologous or heterologous means (Caldas et al., 2023; Tilak, Grayson, & Woodworth, 2023).

However, because most surgeries are not available in the public network and are too expensive for many patients to afford privately, the majority of patients who require surgery end up on the waiting list given by public health facilities. Households. In addition, these individuals exhibit emotional and psychological issues as a result of aesthetic alterations that lower their quality of life. People who have this illness frequently struggle with anxiety, despair, low self-esteem, and social uneasiness. Consequently, this situation has societal ramifications for the patient as well as the relatives and medical professionals who see such anguish (Oswald, Safi, & Gudis, 2023; Rangkuti, Parenrengi, & Suryaningtyas, 2023).

As a result, challenges arise for each party involved in this process, which starts with the diagnosis and goes on indefinitely to raise the patient's quality of life. Complex stages of this process include the following: living in socially stigmatized situations because of changes in appearance; motor and cognitive deterioration depending on the extent of tissue involvement; high costs to meet health demands; emotional exhaustion of emotionally attached participants and the patient himself; and the need for theoretical and practical knowledge about the condition from family members and healthcare professionals (Porto et al., 2023).

RECONSTRUCTIVE SURGERY AND ITS IMPORTANCE:

According to the research, specific techniques, like the minimally invasive approach, have proven effective at lowering the risk of problems and shortening recovery times. Nonetheless, the publications under analysis demonstrated that encephalocele and meningoencephalocele can be treated using various neurosurgical techniques. Furthermore, no single, ideal approach works for all patients. Everything needs to be carefully and uniquely examined. Therefore, a multidisciplinary team must evaluate the surgical approach and decide which surgical procedure to perform based on the patient's clinical history, the stage of development at which the pathology developed during embryonic development, laboratory, and metabolic parameters, the patient's age and disease severity, and other factors given the significance of this surgery for the patient's neurological, social, and aesthetic wellness (Gaudioso et al., 2024; Nugraha, Sobana, & Gantini, 2024).

NEUROSURGICAL METHODS OF APPROACH TO ENCEPHALOCELE:

One technique in question among the neurosurgical techniques mentioned in the papers is the case of frontal encephaloceles, which might affect the orbits, nasal and ethmoid bones. A cranial approach with shaved hair and a typical bi-coronal incision can create a complete gale flap and reveal the frontal bone. The encephalocele sac is then circumferentially dissected to release it from surrounding tissue and to the bone, defining the malformation's boundary. The herniated tissue is excised and sectioned, and electrocautery is used to eliminate it. To guarantee improvement, a pericranial graft is finally bonded using biological glue (Ahmed et al., 2024; Kutz Jr, 2023).

Resection of the transsphenoidal meningoencephalocele that protruded from the Sella region is also done in a different analysis. Preoperative magnetic resonance imaging and computed tomography are essential for improved surgical skills and planning. The technique permits access through the endonasal endoscopic route. It involves making an incision posterior to the nasal cartilage's anterior border and cutting it bilaterally up to the maxillary crest cartilage's disarticulation. The anterior wall of the sphenoid is removed after the perpendicular plates of the vomer and ethmoid are shattered. The meningoencephalocele can be resected by opening the anterior wall of the sphenoid sinus through endoscopic control, which also provides clear vision of the sella (Ifrach, Neavling, Charcos, Zhang, & Mossop, 2023; Magoha, Apondi, & Alinoor, 2023).

Repair for temporal lobe encephaloceles can be accomplished by mastoidectomy, middle fossa craniotomy, or a combination of these techniques. Fossa craniotomy, however, exposes patients to the risk of dural retraction, which might result in problems after surgery. Consequently, the least intrusive approach to endoscopic visualization techniques is employed, allowing for better integrity in the repair of temporal encephalocele, smaller incisions and craniotomies, and a decreased risk of dural retraction. This cuts down on difficulties after surgery and doesn't lengthen the procedure. Additionally, in a different study, a 4-month-old male baby with a frontoethmoidal encephalocele and

an up-and-down herniation of the cerebral parenchyma that projected into the orbit, squeezing the eyeballs, was the subject of research. The surgeon's procedure in this situation involves closing the dura mater, relocating or removing the nonfunctioning brain matter, and reconstructing the skeleton (Fedoua et al., 2023; Spinos et al., 2024).

Initially, a typical bicoronal incision is made on the scalp, preserving the fascia, temporalis muscle, and pericranium as much as possible by cutting it as anteriorly as feasible. A vascularized pericranial graft should be raised to reflect anteriorly along the orbital rims. A bilateral coronal craniotomy is performed by creating a single incision in the anterosuperior sagittal sinus. The defect at the intersection of the frontal and ethmoid bones can be visualized by gently dissecting the dura mater from the calvaria, detaching it, and then carefully retracting the exposed frontal lobes. After locating the herniated portion of the abnormality, the dura mater at the skull's base must be separated to remove it from the brain tissue. After the dura mater has been repaired and closed using the periosteum, the craniomaxillofacial surgeon reconstructs the craniofacial deformity (Eden, Böttcher, & Betz, 2023; Parenrengi & Suryaningtyas, 2024).

SURGICAL METHODS OF THE PLASTIC SURGEON FOR APPROACHING THE ENCEPHALOCELE AND ITS IMPORTANCE:

Learning more about surgical repair and cosmetic techniques concerning encephalocele is crucial. In addition, compromising the diagnosis has an impact on the patient's future aesthetic life as well as social prognosis. Thus, the congenital anomaly is an intracranial hernia caused by a deformity of the skull bases, face bones, bone connections, and the dura mater. Hence, a team of experts from different specialties, including plastic and neurosurgeons, collaborate to create a craniofacial treatment that can be carried out endoscopically or intracranially. The encephalocele's location, size, and kind directly affect surgical care. Despite this, the surgical plan calls for using electrocautery to remove the hernia, fixing the dura mater defect, straightening the bone, and improving the patient's appearance (Chaisrisawadisuk, Khampalikit, Moore, Anderson, & Chaisrisawadisuk, 2023; Lopez et al., 2023).

Encephalocele-related repair and cosmetic treatment calls for a less invasive technique, like a transfacial approach. However, this technique is limited to surgeries with minor deformities. Hypertelorism and fronto-ethmoidal encephaloceles are congruent. In these situations, a more involved operation involving replacing the middle orbital wall is required. Consequently, it is possible to correct both the cranial abnormality and hypertelorism. The Chula technique removes the fronto-nasoorbital bone in a T-shape rather than the frontal bone; another suggested encephalocele surgery approach. Apart from the benefits of repair, like fewer risks from less leakage of CSF and less likelihood of inflammation after surgery, the technique also has aesthetic benefits, like a T-shaped bone flap that widens the nose and shortens the distance between the middle orbit walls (Munekata et al., 2023; Smith et al., 2023).

FINAL CONSIDERATIONS:

Based on the information provided, the meninges and neural tissue herniating cause encephalocele via a defect in the skullcap. This uncommon abnormality affects about 1 in 5,000 persons globally and develops during the neural tube. Various forms can be distinguished based on the tissues that are affected. Although the exact cause of it is still unknown, it is thought to be related to several factors, including the mother's diet, genetic predisposition, and exposure to viral and toxic substances. Consequently, going back to the opening of this essay, it is necessary to emphasize how crucial it is to comprehend the pathophysiology of encephalocele and its different forms.

Every case is highly unique because of the variations in tissues that may be implicated. Because of this, every case needs to be thoroughly examined and evaluated by a multidisciplinary team to ensure that the surgical approach chosen for the patient is appropriate, keeping in mind the significant aesthetic, social, and neurological implications when treating individuals with this pathology. A multidisciplinary team and a synergistic action plan between a plastic surgeon and a neurosurgeon are also necessary for a high-quality outcome.

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