Cancer Therapy & Oncology
International Journal
ISSN: 2473-554X

Juniper Publishers
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Review Article
Volume 21 Issue 3 - May 2022
DOI: 10.19080/CTOIJ.2022.21.556064

Cancer Ther Oncol Int J

The Inveterate Blister-Neurenteric Cyst

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Submission: April 29, 2022; **Published:** May 26, 2022

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Preface

The exceptional, benign, neurenteric cyst possibly emerges as a mal-formative cyst layered with simple, ciliated, or non-ciliated columnar epithelium with incorporated mucous globules. Neurenteric cyst was initially scripted by Kubie in 1928 and by Pussep in 1934 [1,2]. Additionally designated as an enteric cyst, enterogenic cyst, enterogenous cyst, endodermal sinus cyst, intestinal cyst, teratomatous cyst, bronchogenic cyst, respiratory cyst, intestinoma or archenteric cyst, neurenteric cyst is an infrequent, congenital lesion emerging due to persistence of neurenteric canal which conjoins primitive gastrointestinal tract to the neural tube. Neurenteric cyst, Rathke cleft cyst and colloid cyst are contemplated to be endodermal cysts of central nervous system and exhibit an identical morphological countenance.

Upon enlargement, the gradually progressive, benign neurenteric cyst can compress encompassing neural structures. Neurenteric cyst is a midline cyst usually localized within superior, extramedullary cervical segment of spinal cord or may occur within intracranial, cranio-cervical junction, fourth ventricle, foramen of Luschka, temporal lobe or frontal lobe. The cyst can be localized extra-axially, anterior to the brain stem, may extend from the medulla to cervical (C1) spinal cord segment or appear confined within the cerebellopontine angle. Proportionate cyst reoccurrence following inadequate excision of the cyst wall is variable.

Disease Pathogenesis

Infrequently discerned, congenital neurenteric cyst occurs due to anomalous contiguity between endoderm of enteric tube and ectoderm of primitive neural tube. Because of ineffectual segregation, neurenteric cyst canal is layered with cuboidal or columnar epithelium with incorporated mucin producing cells [3,4]. Neurenteric cyst may arise due to "Seessel's pouch origin" hypothesis which enunciates a common origin for suprasellar neurenteric cyst, Rathke cleft cyst and colloid cyst. However, origin of lateral spinal neurenteric cyst remains unexplained with aforesaid hypothesis [3,4]. Besides, "non-comprehensive theory" expounds embryonal failure of disjunction between notochord and foregut with consequent incorporation of primitive endodermal cells within the notochord. As rostral segment of endoderm terminates upon the clivus, hypothesized occurrence of spinal neuroenteric cysts remains obscure. Neurenteric cyst is postulated to originate from an anomalous connection between enteric tract and neural tube during embryogenesis. Neurenteric anomalies appear subsequent to development of notochord and neural tube from a cellular aggregate emerging from Hensen's node [3,4]. A contemporary postulate exemplifies an anomalous migration of endodermal cells through primitive neurenteric canal into the ectoderm with consequent extension into distant cranial and lateral positions [3,4].

Disease Characteristics

Neuroenteric cyst is prevalent in an estimated 0.35% of intracranial lesions and manifests roughly 16% of central nervous system cysts [3,4]. Although designated as a congenital lesion, no age of disease emergence is exempt. Intra-spinal neuroenteric cyst is commonly discerned within the paediatric population whereas intracranial neuroenteric cyst emerges within third decade to fourth decade. An equivalent gender predilection is delineated [5,6]. Although central nervous system can be comprehensively incriminated, neurenteric cyst is commonly confined to posterior fossa or inferior cervical and superior thoracic segments of the vertebral canal [5,6]. Exceptionally, neurenteric cyst is observed within lumbar or sacral region or the cranio-cervical junction [5,6]. Majority of neurenteric cysts emerging within the vertebral column are displaced anterior or ventral to the spinal cord. Alternatively, neurenteric cysts may preponderantly appear within an intra-dural or extra- medullary site, ventral to the spinal cord [5,6]. The uncommon intracranial neurenteric cyst is pre-eminently situated within the infra-tentorial pre-pontine region, cerebellopontine angle, anterior to brainstem, midline of posterior cranial fossa, basal cisterns, cranio-cervical junction or exceptionally within the cisterna magna or fourth ventricle

whereas supra-tentorial cysts are unusual. Besides, neurenteric cysts confined to cerebral parenchyma are extremely exceptional [5,6]. An estimated 50% of neureneteric cysts are associated with skeletal deformities such as scoliosis, spina bifida, Klippel-Feil syndrome, syringomyelia or gastrointestinal tract anomalies as gut duplication, fistula, and anal atresia. In contrast, the infrequent intracranial neurenteric cyst is exceptionally associated with skeletal deformities [5,6].

Clinical Elucidation

Neurenteric cyst may engender symptoms such as hoarseness, mild dysphagia, dysphonia, vertigo, spontaneous nystagmus, imbalance, or unilateral numbness. Hemiparesis, hypoesthesia, headache, sickness, chronic pyrexia, or sleepiness may ensue along with progressive headaches in the absence of neurological disorders [5,6]. The gradually progressive neurenteric cyst may induce posterior displacement of medulla with accompanying hemiparesis and limitation of neck movements [5,6]. Clinically, antecedent lesions are complex wherein mediastinal lesions can engender respiratory distress in neonates. Neurenteric cysts arising in first decade or second decade are accompanied by pain and myelopathy. Symptoms of acute spinal cord compression are common. Nevertheless, despite severe spinal cord compression, neurological signs may be insidious or absent [5,6]. Pyrexia may occur due to postsurgical meningitis and can be appropriately ascertained by lumbar puncture and evaluation of cerebrospinal fluid [5,6].

Histological Elucidation

Upon gross examination, the cyst is circumscribed by an attenuated, greyish capsule which adheres to encompassing brain parenchyma. Neurenteric cyst is a simple, miniature cyst with attenuated cyst wall and magnitude of ≤ 1 centimetre. Upon cutting open, neurenteric cyst is imbued with amorphous, grey/yellow, viscous, gelatinous fluid or an opalescent, mucinous material [7,8]. Upon microscopy, cyst cavity is coated with variably ciliated, mono-stratified, or pseudostratified, columnar epithelium incorporated with mucus secreting goblet cells and a subjacent layer of collagen. Foci of squamous metaplasia can be observed [7,8]. Neurenteric cysts are categorized into three histological subtypes as •type A cyst which is frequent wherein cyst is layered with simple, mono-stratified, or pseudostratified, ciliated columnar or cuboidal epithelium with subjacent vascularized connective tissue. The ciliated or non-ciliated epithelial layer simulates gastrointestinal tract or respiratory tract epithelium. Periodic acid Schiff's (PAS) stain exhibits apical, intracytoplasmic secretory vacuoles [7,8]. •type B cyst exhibits a cyst epithelium incorporated with mucinous glands or serous glands, smooth muscle fibres, striated muscle fibres, mature adipose tissue, cartilage, osseous tissue, elastic fibres, lymphoid tissue, nerve fibres, ganglion cells or accompanying soft tissue [7,8]. •type C cyst is a complex variant wherein epithelium layering the cyst cavity is imbued with ependymal or glial elements. Upon ultrastructural examination, prominent stereo-cilia and a definitive layer of basal cells superimposed upon an attenuated basement membrane is observed [7,8].

Immunohistochemistry

Epithelial layer is immune reactive to epithelial membrane antigen (EMA), cytokeratin, carcinoembryonic antigen (CEA), and CA 19-9. The cyst is uniformly immune non-reactive to glial fibrillary acidic protein (GFAP), neuron specific enolase (NSE), vimentin and S-100 protein [7,8] (Figures 1-8).

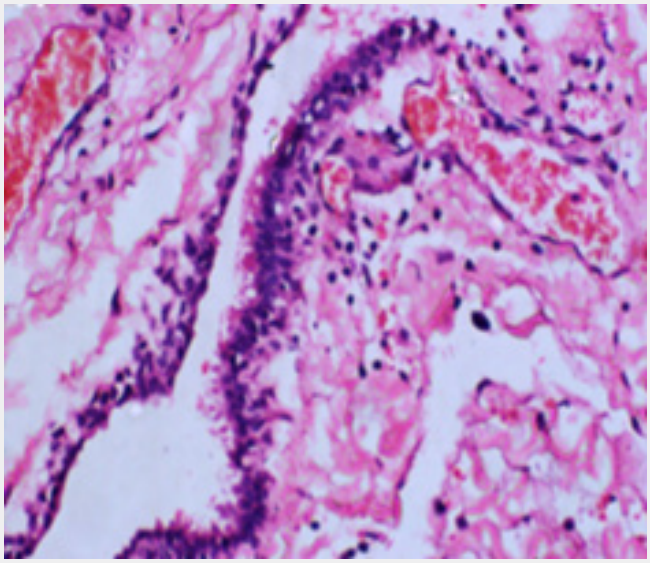

Figure 1: Neurenteric cyst exhibiting a layer of simple, pseudo-stratified ciliated columnar epithelium resting upon vascularized connective tissue [14].

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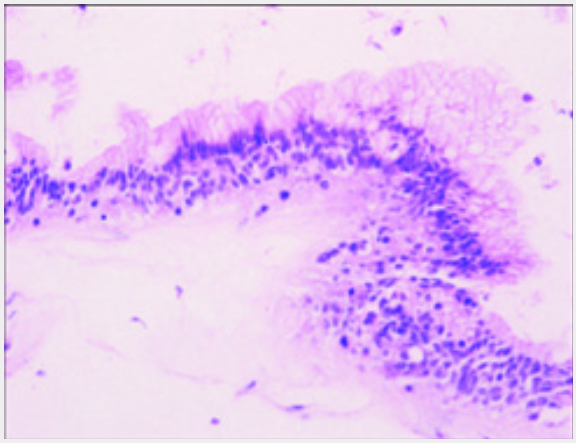

Figure 2: Neurenteric cyst displaying a lining of pseudo-stratified, mucus secreting epithelium with subjacent vascularized connective tissue [15].

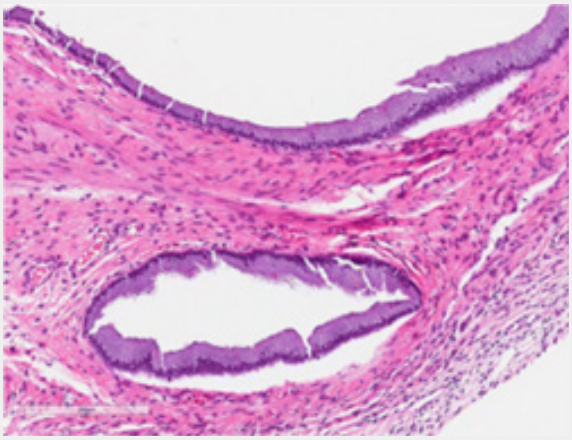

Figure 3: Neurenteric cyst enunciating a cavity coated with pseudo-stratified ciliated columnar epithelium surrounded by vascularized connective tissue [16].

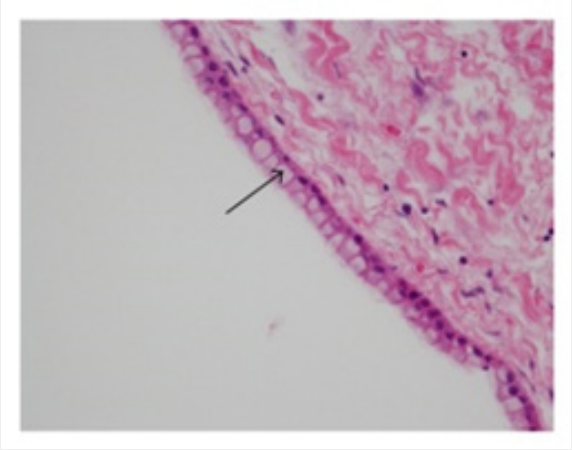

Figure 4: Neurenteric cyst demonstrating a lining of simple, mucus secreting mono-stratified, columnar epithelium with subjacent vascularized connective tissue [17].

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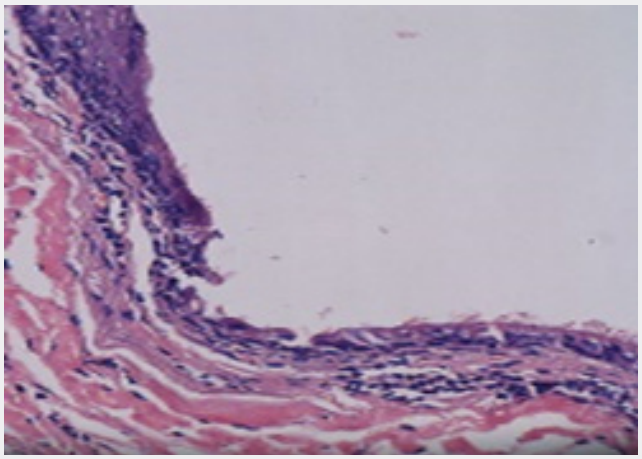

Figure 5: Neurenteric cyst delineating a layer of mono-stratified, simple, ciliated columnar epithelium superimposed upon vascularized connective tissue [18].

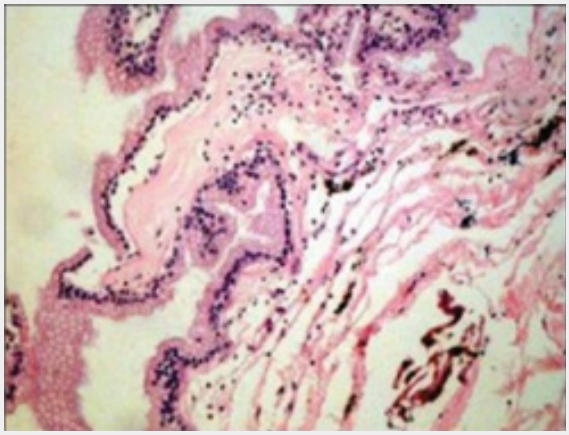

Figure 6: Neurenteric cyst demonstrating mono-stratified, mucus secreting, simple columnar epithelium with circumscribing vascularized connective tissue [19].

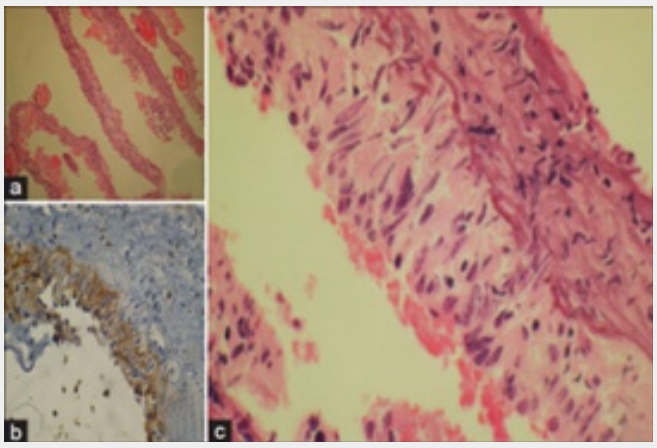

Figure 7: Neurenteric cyst exemplifying a layer of columnar epithelium which is immune reactive to epithelial membrane antigen [20].

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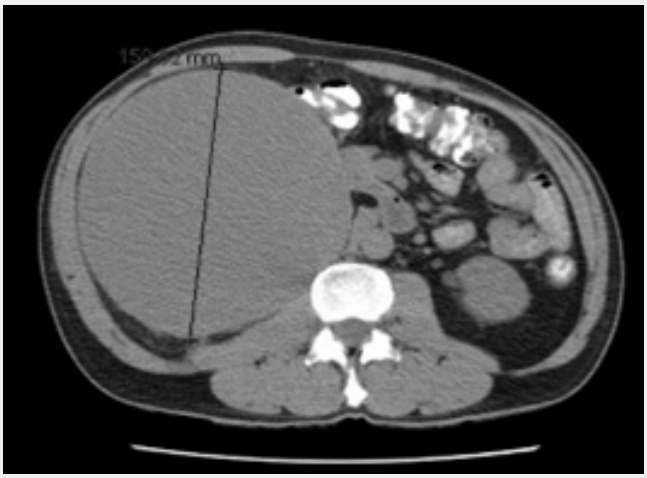

Figure 8: Neurenteric cyst appearing in a retroperitoneal location depicting heterogeneous, hypo-intense areas [21].

Differential Diagnosis

Neurenteric cyst requires a segregation from arachnoid cyst, ependymal cyst, colloid cyst, epidermoid cyst, cysts originating from neuroectodermal tissue and neoplasms of the brainstem [9,10]. Additionally, distinction is required from •choroid plexus cyst wherein the cyst wall is layered with cuboidal to columnar epithelium. Occasionally, a typical "cobblestone" appearance may be discerned, akin to normal choroid plexus. Nevertheless, certain cysts may be devoid of an epithelial layer. Choroid plexus cyst is immune reactive to vimentin, cytokeratin, S100 protein, transthyretin or synaptophysin. Additionally, the cyst is immune non-reactive to epithelial membrane antigen (EMA) and glial fibrillary acidic protein (GFAP) [9,10].

•Colloid cyst commonly emerges within the third ventricle, is circumscribed by hypo-cellular fibrous tissue, and is layered with simple, variably ciliated, columnar epithelium or mucin secreting, pseudostratified epithelium or flattened epithelium. Focal squamous metaplasia is absent. Fragments of normal choroid plexus may frequently adhere to the cyst. Intra-cystic cavity exhibits ghosts of desquamated epithelial cells or eosinophilic, filamentous material simulating actinomyces. Chronic lesions exhibit a xanthogranulomatous reaction [9,10]. •glioependymal cyst usually abuts gliotic neuropril and is lined by simple, ciliated, columnar, or cuboidal epithelium superimposed upon neuroglia. A circumscribing fibrous capsule is absent. Alternatively, cyst wall may be coated with gliosis and an epithelial layer can be absent. Rosenthal fibres may be observed along with variable quantities of hemosiderin pigment. The cyst is immune reactive to S100 protein and glial fibrillary acidic protein (GFAP) [9,10].

•Papillary endolymphatic sac tumour appears within bone or upon cerebellopontine angle. The neoplasm is configured of simple papillary structures coated with singular layer of well demarcated, columnar to cuboidal epithelial cells. An apparent myoepithelial layer enmeshed within flattened stroma can be delineated. Epithelial cells demonstrate pale-clear cytoplasm and uniform, centric or luminal nuclei. Frequently, granulation tissue, miniature vascular spaces and an acute and chronic inflammatory infiltrate appear adjacent to tumour cell nests [9,10]. Occasionally, hyper-cellular areas akin to thyroid- like, cystic glandular spaces are discerned which are imbued with colloid-like substance. Foci of recent haemorrhage appear commingled with cholesterol clefts [9,10]. Cellular pleomorphism is minimal. Mitotic figures or foci of necrosis are minimal or absent [9,10].

Investigative Assay

Upon computerized tomography (CT), a hypodense lesion appears confined to cranio-cervical junction or cranio-vertebral junction. A cerebellar hematoma extending into the fourth ventricle engendering moderate hydrocephalus may be observed [11,12]. Neurenteric cyst appears bright upon pre-contrast imaging, simulating Rathke cleft cyst and colloid cyst [11,12]. Magnetic resonance imaging (MRI) is an optimal, recommended investigative modality adopted for discerning neurenteric cyst wherein variable signal characteristics are exemplified [11,12]. Upon T1 weighted magnetic resonance imaging (MRI), a heterogeneously hypo-intense lesion devoid of solid enhancing component is observed. T2 weighted imaging (MRI) of the brain exhibits a well-defined, homogeneously hyper-intense lesion. Perilesional oedema is variable or absent [11,12].

The lesion is hyper-intense upon fluid attenuation inversion recovery (FLAIR) sequence and heterogeneously hypo-intense upon diffusion-weighted imaging (DWI) [11,12]. Neurenteric cyst is devoid of contrast enhancement although a mild, posterior rim enhancement occurs on account of chronic inflammation engendered with recurrent cyst rupture [11,12]. Positron emission tomography (PET-CT) may be unremarkable, and the lesion may lack metabolic activity [11,12].

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Therapeutic Options

Complete surgical extermination of the cyst is a recommended, optimal therapeutic strategy. Clinical manifestations regress following competent surgical excision [12,13]. Although radical surgical resection may circumvent cyst reoccurrence, the attenuated cyst capsule may adhere intensely to the brainstem and comprehensive eradication of the capsule may be challenging [12,13]. Consequently, neurological deficit may occur, especially in neurenteric cysts confined to posterior cranial fossa [12,13]. Comprehensive surgical eradication is possible in spinal neurenteric cysts although intracranial, cranio-cervical cyst or lesions of the fourth ventricle may be incompletely resected with cyst capsule firmly adhered to cerebral vascular articulations, brainstem, cranial nerves cisterns, pia mater or diverse neural articulations. Proportionate cyst reoccurrence is minimal with comprehensive surgical eradication of the cyst and prognostic outcomes are excellent [12,13].

Partial excision of intramedullary neurenteric cyst can be attempted as comprehensive eradication of capsule may enhance associated neurological deficits [12,13]. Alternatively, simple cyst aspiration, marsupialization of cyst wall or a syringo-subarachnoid shunt can be employed in addition to or in the absence of preceding, partial resection of the cyst [12,13]. Steroids and hypertonic saline can be administered to decimate intracranial pressure or accompanying cerebral oedema [12,13]. Conventional radiotherapy for treating residual, benign, cystic lesion is usually inefficacious. Chemotherapy is not indicated for treating neurenteric cyst [12,13]. Following surgical intervention, mild dysphagia, dysphonia, vertigo, spontaneous nystagmus, imbalance or unilateral numbness with facial numbness and hemiparesis may ensue on account of cyst reoccurrence, which is discernible upon MRI [12,13]. Regular MRI scans can be adopted for extensive monitoring required with delayed cyst reoccurrence. Repetitive lesion appears as well defined and heterogeneously hyper-intense or isointense upon T1 weighted imaging with absence of solid, enhancing components. Upon T2 weighted imaging, reappearing cyst is homogeneously hyper-intense. Preliminary surgical eradication is necessitated for treating antecedent or delayed cyst recurrence or extraction of cyst capsule remnants. Reappearing cysts with progression of clinical signs can be subjected to ventriculo-peritoneal shunt [12,13].

Subtotal surgical resection is associated with cyst reoccurrence and exacerbation of clinical symptoms which can be appropriately managed with relapse surgery, excision of reoccurring cyst, ventriculo-peritoneal or cyst-peritoneal shunting. Alternatively, cyst reappearance with firmly adherent cyst capsule towards the incision area can be treated with silicone stent incorporated within the cyst cavity [12,13].

References

1. Kubie LS (1928) A clinical and pathological study of two teratomatous cyst of the spinal cord, containing mucous and ciliated cells. Surg Gynecol Obstet 47: 297–311.
2. Puusepp M (1934) Variete rare de teratome sousdural de la region cervicale (intestinome): quadriplegie, extirpation, guerison complete. Rev Neurol 2: 879–886.
3. J M Taveras, E H Wood (1976) Second edition Developmental abnormalities, and edn. Williams and Wilkins. Baltimore, Maryland, USA, pp. 1139–1158.
4. Gavrjushin AV, Chelushkin DM (2021) Intra-axial Neurenteric Cyst of Medulla: Case Report and Literature Review. Cureus 13(5): e15361.
5. J Iglesias, Carrasco P, P De la Fuente, L Galbarriatu, C Paternain, et al. (2021) Neurenteric CYST of the craniocervical junction. Case report. Interdisciplinary Neurosurgery 23: 100852.
6. Nelson SM, Mathis DA, Joseph K Hobbs, Vincent M Timpone, et al. (2017) Intracranial neurenteric cyst mimicking an ependymoma: imaging features, pathologic correlation and review of literature. Clin Imaging 44: 117–120.
7. Kozak J, Bizik I, J Surkala, J Steno, A Steno, et al. (2019) Neurenteric cysts, incidence and surgical treatment. Bratisl Lek Listy 120(9): 680–685.
8. Chen CT, Lai HY, Shih-Ming Jung, Ching-Yi Lee, Chieh-Tsai Wu, et al. (2016) Neurenteric cyst or neuroendodermal cyst? Immunohistochemical study and pathogenesis. World Neurosurg 96: 85–90.
9. Goes P, Vaz-Guimaraes F (2018) Supratentorial neurenteric cyst: analysis of 45 cases in the literature. Interdiscip Neurosurg Adv Tech Case Manag 11: 57–64.
10. Breshears JD, Rutkowski MJ, Michael W McDermott , Soonmee Cha, Tarik Tihan, et al. (2015) Surgical management of intracranial neuroenteric cysts: the UCSF experience. J Neurol Surg B Skull Base 76(6): 475–479.
11. Shimizu Y, Fujita N, Osamu Akiyama, Mario Suzuki, Akihide Kondo, et al. (2019) A rare presentation of a pediatric neurenteric cyst as an intra-axial pontine lesion: a case report with a 5-year follow-up. Surg Neurol Int 10: 236.
12. Agresta G, Sokol D, Chandrasekaran Kaliaperumal, Jothy Kandasamy, Pasquale Gallo (2020) A novel management proposal for intrinsic brainstem neurenteric cysts: case report. J Neurosurg Pediatr 25: 83–87.
13. Li T, Wu X, Zhang Y (2017) A rare presentation of an enterogenous cyst as an intra-axial pontine lesion. World Neurosurg 100: 707–703.
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15. Image 2 Courtesy: Research gate
16. Image 3 Courtesy: Springer link.
17. Image 4 Courtesy: Hindawi.com
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