



GIANT BRANCHIAL CLEFT CYST OF THE NECK: A CASE REPORT

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ABSTRACT

Background: Branchial cleft cyst is a benign lesion of the neck caused by altered development of branchial apparatus. It is one of the most common congenital lesions of the neck, usually diagnosed before adulthood. The cyst can increase in size and cause asymmetry of the neck. **Purpose:** To provide information regarding management of giant branchial cleft cyst. **Case Report:** We reported a female patient, 35 year old with mass on the right neck, MSCT scan showed iso-hypodense lesion which extends to right supraclavicular region and deviates the trachea and surrounding tissue to the left. Patient was diagnosed with right branchial cleft cyst and surgical excision was done to remove the cyst. The large cyst has adhered to adjacent structure and some strap muscles has to be sacrificed during the procedure. **Method:** Literature search using the keyword 'Branchial Cyst' AND 'Neck Cyst' AND 'Large' AND 'Surgery' was done on PubMed, ScienceDirect, and Google Scholar. **Result:** The search obtained 9 articles published in the last 5 years. Based on inclusion and exclusion criteria, 3 studies related to the topic was selected. **Conclusion:** Surgical excision with approach of transverse wide cervical incision remains the treatment of choice for branchial cleft cyst. Careful identification and separation of the cyst and critical neck structures in the surrounding is important. Aspiration of the cyst during the procedure can be done to reduce the volume of the cyst when necessary. Endoscopic approach can be done if the cyst is small in size. Incision and drainage, sclerosing therapy and repeated aspiration of the cyst should be avoided to reduce recurrency and disrupt the surgical planes for later surgery.

Keywords: Branchial Cleft Cyst, Neck Cyst, Neck Mas

Introduction

Branchial anomalies are neoplasms that are benign in nature, it is caused by alteration in the development process of branchial apparatus during embryogenesis. This modification occurs usually between the second and seventh week. Though uncommon, the persistence of branchial remnants can develop to become cyst, sinuses, fistulas or islands of cartilage ¹.

Anomalies of branchial cleft are the second most prevalent congenital lesions to appear in the neck, comprising for 20% of all congenital lesions of head and neck. The occurrence of bilateral branchial cleft cyst is only about 1%. Both male and female are affected proportionately and majority of the lesions are diagnosed prior to adulthood ².

There are four types of branchial cleft cyst as classified by Bailey: type I: deep to platysma muscle and anterior to sternocleidomastoid (SCM) muscle, type II: adjacent to the internal carotid artery and sticking to the internal jugular vein, type III: extending in the middle of the internal and external carotid arteries, type IV: neighboring the pharyngeal wall and potentially extending in superior direction to skull base. The second type is the most common type, comprising 90-95% of cases ^{1,2}.

Second branchial cleft cysts are seen on the anterior border of SCM muscle at the junction of upper 1/3rd and lower 2/3rd of the muscle, at the lateral to the carotid space and on the posterior edge of the submandibular gland ³.

Second branchial cleft cyst usually presents as smooth and round mass of the neck which is not tender to touch, and painless located at the upper third of the anterior border of SCM. Many of the lesion are not noticed until it is infected. It may enlarge in size following upper respiratory tract infection ^{2,3,4}.

Symptoms that appear follows the size of the mass, being asymptomatic when it is small in size. If the size become sufficiently large, it can cause asymmetry of the neck, deviation of trachea, dyspnea, dysphagia, change in phonation and torticollis ².

Although it is mainly known as congenital anomalies, cases in adulthood are most often found between the third and fifth decade of life ².

Surgical excision of the branchial cleft cyst remains as the definitive treatment for branchial anomalies. The approach of surgery is through an incision over the protruding zone and endoscopic surgery ^{2,5}. In this case, we present a case of branchial cleft cyst which grows to a large size and discuss the clinical aspect, recurrence and management of this case based on review of literature.

Case Report

A 35 year old female came to Dr. Sardjito General Hospital with complaint of mass on the right side of the neck. The mass had appeared for 3 years and increases in size gradually. The mass was around the size of a chicken egg when first noticed and located between the neck and jaw. Its size increases gradually by time in 2 years and started to grow more rapidly after the patient suffered from a long period of respiratory tract infection and underwent aspiration of the mass. There were no symptoms at first, but recently started complaining of dyspnea, especially when laying down and facing the left side due to pressure

of the mass. There was no complaint of tenderness, pain, disturbance in swallowing solid food and water.

On physical examination of the neck, the mass on the right side of the neck extended from the lower jaw until upper border of clavicle, around 18x10x8 cm in size. On palpation, the mass was cystic and mobile, fluctuates with movement, skin was similar to surrounding, no tenderness was found.



Figure 1. Mass on the right neck

MSCT examination showed iso-hypodense lesion on the right neck measuring 12x8x7.8cm which deviated the trachea and surrounding tissue to the left and extended to right supraclavicular region. The conclusion was a solid-cystic mass in right colli which deviated trachea, vertebræ and surrounding soft tissue to the left and extended to right supraclavicular region.

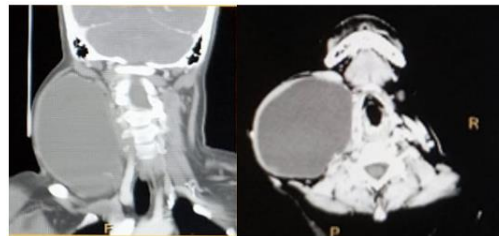


Figure 2. MSCT examination

Fine needle aspiration biopsy (FNAB) was conducted and the result was white-milky fluid aspirate showing monomorphic squamous cells with round and oval nucleus with fine chromatin, no malignant cell was found, with suggestion of branchial cyst.

The patient was diagnosed with Right Branchial Cleft Cyst and treatment was surgical extirpation of the branchial cleft cyst.

The goal of the treatment was to remove the cyst, restore normal skin condition and preserve the anatomical condition of the neck.



Figure 3. Preoperative marking

Transcervical wide incision was made over the midpoint of the cyst along the Langer line to preserve maximal cosmetic function. Superior and inferior Subplatysmal flap were raised. The cyst was separated from the fascia that envelops the SCM.

Whole cyst extirpation without sacrificing the surrounding structure was attempted, but some of the strap muscles adhered tightly to the cyst due to prolonged compression and cannot be separated from the cyst and had to be excised. Other vascular and nervous structures was successfully preserved.

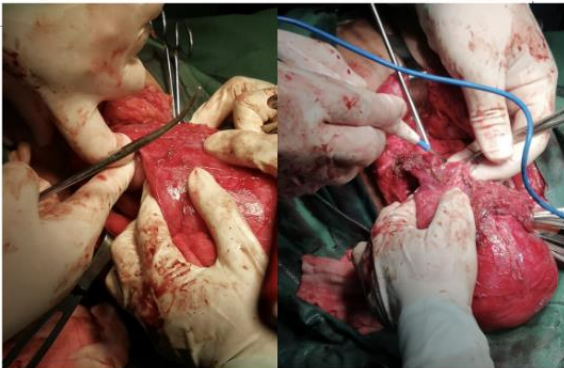


Figure 4. Cutting of strap muscle that adhered to the cyst

Before the extraction of the cyst, the search for the originating tunnel was conducted to prevent recurrence. The tunnel was sutured before it was cut. The resected cyst measured around 12x12x4cm, the difference of the dimension compared to the results of physical and radiologic examination is due to the change in the confinement space and leakage of the cyst fluid during the operation. Other critical structures such as vascular bundle and nerves were successfully preserved during the procedure.



Figure 5. Identification of the originating tunnel.



Figure 6. Neck structures after removal of cyst.



Figure 7. Extirpated neck cyst

The skin flap was closed without removal of skin. Drain was placed into the operated space to allow drainage of blood and other fluids out from the neck space. The drain was kept during the stay in the hospital and removed after 6th day. Patient was discharged after the 8th day of care and planned for weekly visit to ENT clinic for post-operative care.



Figure 8. Post-operative appearance

The patient returns to ENT clinic weekly for 2 weeks after surgery for wound care. After 6 months, there was no recurrence of neck mass reported or swelling and no complaint of limited neck movement. Hypertrophic scar was visible on the area of incision.



Figure 9. At 6th Month Follow up After Surgery

Method

The literature search is obtained using the keywords 'Branchial Cyst' AND 'Neck Cyst' AND 'Large' and 'Surgery' on the search engines of PubMed, Science Direct and Google Scholar. Inclusion criteria are those which discussed branchial cyst and treated or removed with surgery. Exclusion criteria were other neoplasms of the neck both benign and malignant, cases in utero, cases in children, cases not treated or removed with excisional interventions and those treated with endoscopic surgery.

Result

Based on the literature finding in the last 5 years, 9 articles were found. After selection based on the inclusion and exclusion criteria, 3 articles were relevant to the topic.

Table 1. Search Strategy

Literature	Result	Keywords
PubMed	2	'Branchial Cyst' AND 'neck cyst' AND 'large' and 'surgery'
Science Direct	3	
Google Scholar	4	

Tawfeeq et al reported a 30 year old male who came a lateral neck swelling for duration of 5 years which first appeared after a severe respiratory tract infection. The patient had undergone several aspirations of the cyst and experienced recurrence. Radiologic examination showed a second branchial cleft cyst with a size of 5.3x3.8x6.6 cm in maximum and the patient underwent surgical incision to remove the cyst. During the surgery, there was no normal structure that was taken aside from the cyst. The removed cyst was around 6x5x4cm after injected with saline ⁴.

Asprea et al reported a 17 year old male with left lateral cervical swelling. Radiologic examination showed an almost spherical shaped mass with dimension of around 8cm. Surgical excision of the mass was done without residue and without intraoperative bleeding. The patient was discharged after 3 days, no postoperative complication was reported. After 18 months, the patient reported no recurrence ⁸.

Bocchalini et al reported a 32-years old woman with history of right sided neck swelling for 15 days. Ultrasonographic examination showed a cystic mass about 7x4cm and MRI showed mass extrinsic of the SCM. Surgical excision was done through right transverse cervical incision and the mass was removed completely after careful dissection ¹.

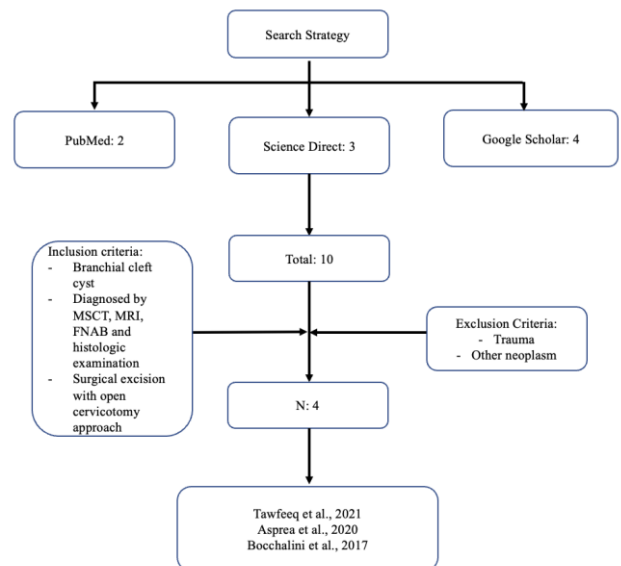


Figure 10. Literature Search Flow

Discussion

Branchial cleft cyst is a common cause of swelling in the soft tissue of the neck that generally appear unilaterally and in the lateral aspect of the neck. Most of

the branchial cleft apparatus anomalies originate from the second cleft, comprising about 95% of cases. More than 75% of all 2nd branchial cleft abnormalities are cyst, which presents in individuals between 10 to 40 years old. In adults of more than 30 years of age, new lateral neck mass should be considered malignant until proven otherwise. Conditions to consider include lymphadenopathy (metastatic, reactive, neoplastic, and lymphoma), lymphangitis, lymphangioma tuberculosis, hemangioma, tumor of carotid body, cystic hygroma, odontogenic or dermoid cyst, ectopic thyroid or salivary tissue, salivary gland infection, vascular neoplasm or malformation thyroglossal duct cyst, cat scratch disease, and cystic squamous cell carcinoma^{1,2,6}.

Branchial cleft cysts form early in gestation, one theory stated that it is caused by incomplete involution of branchial cleft structures during embryonic development, making it a congenital condition. Other theories are incomplete obliteration of the branchial mucosa, thymopharyngeal ductal origin, persistence of vestiges of the pre-cervical sinus, and cystic lymph node origin. It is common to first appear or enlarge acutely after upper respiratory tract infection^{1,4}.

Clinical presentation includes painless, compressible swelling at the anterior margin of the SCM, between the mandible and clavicle. It shows a positive transillumination test, used to detect whether light can penetrate through the swelling when illuminated, and fluctuant in nature. The size varies from 1 to 10 cm and one study reported the mean diameter of 3.29 cm. Its size may increase rapidly after an episode of upper respiratory tract infection or secondary infection as of this case^{1,4,6,7,9}.

Diagnosing branchial cleft cyst can be done by using medical history taking, clinical presentations and excluding other diseases. Several pre-operative diagnostic procedures include CT, MRI, sonography and fine-needle aspiration⁶.

Radiological examinations can help in diagnosing branchial cleft cyst. It typically appears as well-circumscribed, thin-walled, and homogenous, non-enhancing cyst located at the anterior-medial border of the SCM, in position posterior to the submandibular gland, and lateral to the carotid space. There are reported cases with slight variations of radiologic result such as solid component presenting inside the cyst suggesting papillary carcinoma of thyroid arising within branchial cyst, cyst within cyst and multilocular cyst. Both CT-scan and MRI are preferred in the evaluation of branchial cleft cyst. Radiologically, branchial cyst presents as low density lesion on CT, hypointense to isointense on T1-weighted MRI and hyperintense on T2-weighted MRI with uniformly thin rim with possible mild enhancement. CT can help determine the boundaries and anatomical relationship with adjacent structures and confirms its cystic nature. MRI is preferred for Type I first branchial cleft cyst and for second branchial cleft lesion in parapharyngeal. Ultrasonography can be used in places where CT or MRI is not available, however it does not adequately evaluate the extent and depth of neck lesions^{2,6,11}.

Cytologic examination from fine needle aspiration biopsy shows brownish or straw-like colored fluid or a murky, thick fluid consisting of cholesterol and squamous epithelial cells. Another description of the cyst content is pus-like fluid, keratinized anuclear cells, squamous epithelium, and a matrix of amorphous debris^{1,6}.

Histological examination is performed after surgery to confirm diagnosis. The cyst is lined by mostly stratified squamous or pseudostratified columnar epithelium and ciliated, resting on a complete or incomplete band of lymphoid tissue, similar to tonsil or other lymphatic tissue of pharynx while other segment of the cyst wall mimicking a lymph node. The lymphoid tissue has a follicular pattern with a germinal center or diffuse band-like pattern^{1,4,6}.

Treatment for branchial cleft cyst mainly focuses on open surgical treatment as full excision of the cyst remains the gold standard. Antibiotic can be given if there is active infection of the cyst. Incision and drainage of the cyst is avoided as it may cause alteration of surgical planes and causing difficulties in identifying nearby structures. The removal of the cyst is not an emergency procedure, unless there is an indication such as compromise of airway or large abscess^{2,4,12}.

The main choice of approach is transverse cervicotomy or wide cervical incision, careful dissection of the structures surrounding the cyst for separation, identification of critical structures such as internal and external carotid artery, vagus, hypoglossal, glossopharyngeal and superior laryngeal nerves, locating the originating tunnel of the cyst for ligation, and complete extirpation of the cyst. Incision is made along the Langer line of the neck for cosmetic purpose. If the cyst is large in size, the cyst may be aspirated partially to reduce its size and aid in the excision of the cyst. In our case, the cyst was not aspirated beforehand to maintain the shape and tension of the cyst in relation to the skin^{2,4,12}.

There has been development in the method of excision of branchial cleft cyst such as transoral excision, retroauricular excision or endoscopic excision which offer less visible scar. However, these techniques have higher risk of injuring critical neck structures and incomplete removal of the cyst. These methods are currently less favorable compared to transverse cervicotomy after a wide lateral neck incision although the aesthetic result may be less pleasing^{5,12}.

Complications of branchial cleft are recurrence, persistent fistula, damage to cranial nerve. Recurrence rate is around 3-20%, with increased risk in cases of previous recurrence and surgery, cyst that undergo incision and drainage, radiation or sclerosing agent, and incomplete removal of the cyst^{2,4,6,7,12}.

Conclusion

Branchial cleft cyst is a common cause of lateral neck mass in children and considered rare in adults, therefore malignancy has to be ruled out. Its size can vary widely from small cyst to a very large mass which can cause disturbance to nearby structures such as vascular bundle, nerves and airway. Although diagnosis can be made from history and physical examination, additional radiologic and cytologic examination will aid us during the removal of the cyst. The gold standard of treatment is surgical management with open surgery through wide excision to remove the cyst completely and reduce the recurrence.

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