GIANT BRANCHIAL CLEFT CYST OF THE NECK: A CASE REPORT

Rian Kurniawan Laksono***, Sagung Rai Indrasari*, Camelia Herdini*, Danu Yudistira*, Artanto Wahyono***

*Department of Otorhinolaryngology-Head Neck Surgery; Dr. Sardjito General Hospital Faculty of Medicine, Nursing, and Public Health Universitas Gadjah Mada, Yogyakarta
**Faculty of Medicine Duta Wacana Christian University
***Surgical Oncology Division Department of Surgery Dr. Sardjito General Hospital; Faculty of Medicine, Nursing, and Public Health Universitas Gadjah Mada, Yogyakarta.

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.

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.

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 to 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.

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

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.

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.

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

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. 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](image1)

**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, vertebrre and surrounding soft tissue to the left and extended to right supraclavicular region.

![Figure 2. MSCT examination](image2)

**Figure 2. MSCT examination**

Fine needle aspiration biopsy (FNAB) was conducted and the result was white-milkish 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.
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.

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.
The skin flap was closed without removal of skin. Drain was placed into the operated space to allow drainage of blood and other fluids 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

<table>
<thead>
<tr>
<th>Literature</th>
<th>Result</th>
<th>Keywords</th>
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<td>Science Direct</td>
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<td></td>
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<td>Google Scholar</td>
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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 5.

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.

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 branched 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, lymphangiomia 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, thymo-
pharyngeal duct origin, persistence of vestiges of the
pre-cervical sinus, and cistic 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
aspiration 6.

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
left cyst and for second branchial left 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
mucky, 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 3,4,12.

The main choice of approach is transverse
cervicotom 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
extraction 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 cervicotom after a wide
lateral neck incision although the aesthetic result may be
less pleasing 3,12.

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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