BRANCHIAL ANOMALIES

A. FRANCHELLA[1], S. PELLEGRINELLI[1], F. CARINCI[2], I. ZOLLINO[2], G. CARNEVALI[2], V. CANDOTTO[2], S. FRANCHELLA[2], V. PINTO[3], G.P MORSELLI[3]

[1]Department of Pediatric Surgery, University of Ferrara, Ferrara, Italy
[2]Department of D.M.C.C.C., Section of Maxillofacial and Plastic Surgery, University of Ferrara, Ferrara, Italy
[3]University of Bologna, School of Plastic Surgery, Plastic Surgery Unit S. Orsola Hospital, Bologna, Italy

Branchial anomalies are masses located in children' neck. They are composed of an heterogeneous group of congenital malformations mainly fistulae, cysts, sinus tracts and cartilaginous remnants. Females and males are affected equally and many lesions are diagnosed before child reaches adulthood. Aim of this retrospective study is to asses the clinical outcome in a series of patients affected by branchial anomalies and discuss the pertinent literature. In the period between January 2001 and December 2010, 31 patients underwent to surgical correction of branchial anomalies at the Pediatric Surgery Unit, S Anna Hospital, Ferrara, Italy. Patients included 15 (48.4%) females and 16 (51.6%) males. Age ranged from 5 months to 15.6 years with a mean value of 5.1 years at the time of admission. There were 16 fistulae 5 cysts and 10 branchial remnants All cases were surgically corrected under general anesthesia. Cervical cysts occur in children and adolescents as a mass situated anterior to the sterno-cleid muscle and near the angle of the mandible. Cervical symptoms may consist of drainage from a pit –like depression at the angle of mandible. The definitive treatment of all branchial anomalies is the surgical for a complete excision. Complete surgical resection through a wide transverse cervicotomy results in good prognosis. Identification during operation, of the internal and external carotid arteries and of the vagus, hypoglossal, glossopharingeal and superior laryngeal nerves will avoid injury of these structures.

Branchial anomalies are masses located in children' neck. They are composed of an heterogeneous group of congenital malformations mainly fistulae, cysts, sinus tracts and cartilaginous remnants. Females and males are affected equally and many lesions are diagnosed before child reaches adulthood (1).

Several theories have been proposed regarding the origin of anomalies such as the incomplete obliteration of branchial mucosa, persistence of vestige of the pre-cervical sinus, thymopharingeal ductal origin and cystic lymphnode origin (2). The brachial apparatus, that begin to form in the second week of fetal life and is completed by the sixth or seventh week, is probably the structure most widely believed to be the source of brachial cysts, however, definitive data remain elusive (3).

Branchial cleft cyst or cervical lymphoephitelial cyst represents a unilateral soft tissue swelling that typically appears in the lateral neck. Particularly, cysts and fistulas of the neck are believed to derive from the second branchial arch. Second arch abnormalities can sub-classified into four types of lesions by using their anatomical location (4): 1 - lesions which are anterior to the sternocleidomastoid muscle (SMC) and are not in contact with carotid artery; 2 - lesions which are deep in the SCM and either are anterior or posterior to the carotid artery; 3 - lesions which pass between the internal and external carotid arteries and are adjacent to pharynx; 4 - lesions which are medial to the carotid sheed and are in close proximity to the pharynx adjacent to the tonsillar fossa.

Cysts and fistulae usually present as a non tender mass in the neck, which may actually increase in size after un upper respiratory tract infection. However, if large enough the anomalies can cause asymmetry of the neck as well

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Corresponding author: Prof. Francesco Carinci, M.D
Department of D.M.C.C.C.
Section Maxillofacial and Plastic Surgery,
University of Ferrara
Corso Giovecca 203 44100 Ferrara Italy
E-mail: crc@unife.it Web: www.carinci.org
Phone: +39.0532.455874 Fax: +39.0532.455876

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as dyspnea, dysphagia and dysphonia. The swelling is usual unilateral but cases of bilateral cysts or sinuses have been reported with incidence of 2-3% (5). The discharge is usually a milky, mucoid material. Infected cysts can develop into abscess, especially during periods of upper respiratory tract infections, due to lymphoid tissue located beneath the epithelium (6). Fistulas are usually diagnosed in childhood and typically have chronic drainage from an opening along the anterior part of the SCM in the lower third of the neck.

Neonates have been reported to present with rapid enlargement of the neck mass, as the infant swallows leading to potential tracheal compression and respiratory compromise. However, an occasion cysts may present as a cold thyroid nodules and may be mistaken for thyreoglossal duct cysts.

Therefore, to make diagnosis of these lesions history and physical examination are the most important factors to consider. Physical examination could even include a upper airways endoscopy to visualize the opening into pharynx the tonsillar fossa and the pyriform sinus. In children incisional biopsy should not be performed such as it could make subsequent resection more difficult as the cyst will no longer be well defined.

Aim of this retrospective study is to asses the clinical outcome in a series of patients affected by branchial anomalies and discuss the pertinent literature.

MATERIALS, METHODS AND RESULTS

In the period between January 2001 and December 2010, 31 patients underwent to surgical correction of branchial anomalies at the Pediatric Surgery Unit, S Anna Hospital, Ferrara, Italy.

Patients

Patients included 15 (48.4%) females and 16 (51.6%) males. Age ranged from 5 months to 15.6 years with a mean value of 5.1 years at the time of admission. There were 16 fistulae 5 cysts and 10 branchial remnants

Treatment

All cases were surgically corrected under general anesthesia.

DISCUSSION

Neck masses are not uncommon in children (7). Atcherson (8) was the first who described 11 cases of branchial fistulae equaling the development of lateral cysts to that of cysts to their location.

The branchial apparatus consisting of six branchial arches separated by five branchial clefts appears by the 15th day of intrauterine life; is postulated that the incomplete

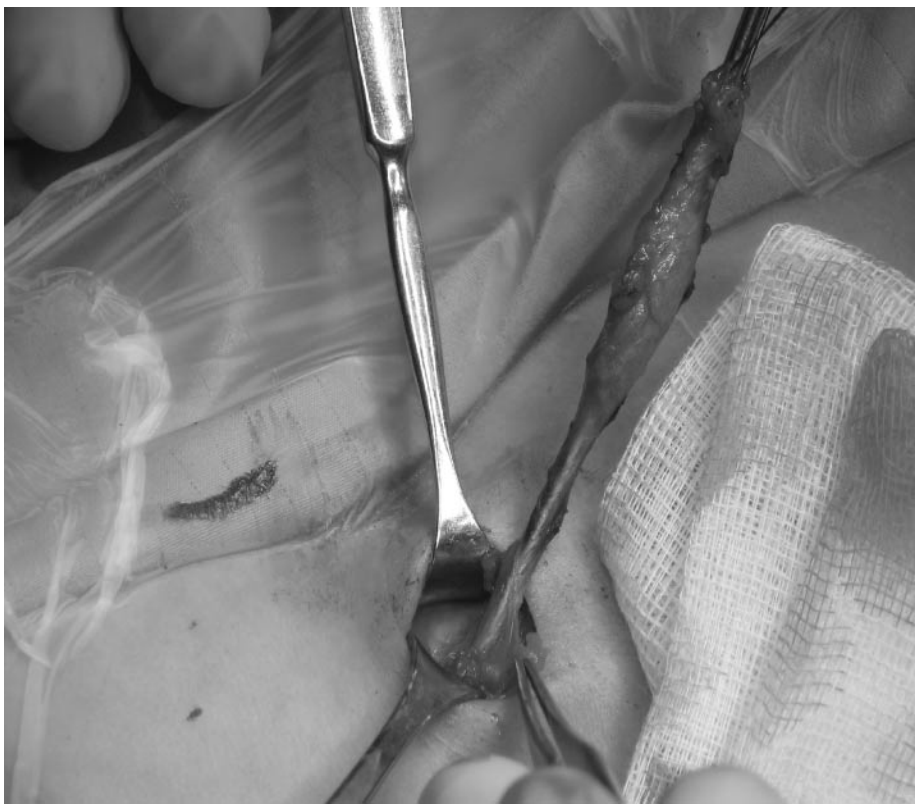

Fig. 1. *Branchial fistula*

obliteration of the branchial apparatus, predominantly the cleft, can lead the branchial cleft anomalies such cysts and sinues fistulae (9). A second theory was suggested by His (10) considering the branchial cysts and fistulae as vestiges of cervical sinus rather than of the pharyngeal clefts or pouches.

Cervical cysts occur in children and adolescents as a mass situated anterior to the SMC and near the angle of the mandible. Work et al (11) classified these anomalies into two groups: type I anomalies present as a cyst mass which are pure ectodermal, while type II anomalies present as a cyst, sinus or fistula or a combination of both and they are of ectodermal and mesodermal origin. However, Triglia et al (12) thought that clinical manifestations and finding of a careful physical examination are more helpful than an anatomical and histological classification in achieving early diagnosis and management of branchial cleft lesions.

Cervical symptoms may consist of drainage from a pit –like depression at the angle of mandible. Incidence of fistulas is about 1 to 10 than branchial cysts. Histologically, cysts are more commonly lined by squamous epithelium whereas sinus and fistulae are more likely to contain ciliated columnar epithelium. Cholesterol crystals may be notice in the mucoid fluid found with cysts. Ordinarily, a branchial cysts gives not trouble but complications may occur, such as infections. Thus, the definitive treatment of all branchial anomalies is the surgical for a complete excision as this kind of lesions will not resolve spontaneously. Complete surgical resection through a wide transverse cervicotomy results in good prognosis. It may be possible to cannulate the stretch between the mouth and skin at the origin cyst with a 2-0 or 3-0 monofilament suture or a probe to aid in dissection. Some surgeons prefer to inject the tract with methylene blue, although this may stain the surrounding tissues and make dissection difficult. As the tract is dissected superiorly, it may be necessary to extend the cervical incision to aid in exposure. Most surgeons, however, prefer a step-ladder incision to gain better visualization of the upper portion of the tract as it enters the superior pharynx. (4). Identification during operation, of the internal and external carotid arteries and of the vagus, hypoglossal, glossopharingeal and superior laryngeal nerves will avoid injury of these structures (12).

By the time of surgery is performed about 20% of lesion that is infected by bacteria coming from upper airways at one time (13). Some Authors recommended early resection of these anomalies to avoid this complication although, no age is specified. O'Maraand Roback (13) suggest waiting until the child is 2 or 3 years of age. In case of acute infection, antibiotics and needle aspiration should be given and if they fail an incision for drainage may be required. Other treatment modalities that have been reported are radiation therapy, repeated incision and drainage and the use of sclerosing agents (14). These modalities are considered non curative and if performed before surgery can increase the recurrence rate after surgical excision (15).

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