

A clinical study on branchial arch anomalies

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Abstract:

Objectives: To analyse retrospectively the data of our patients, who were diagnosed and treated for branchial anomalies in our department.

Materials and Methods: Retrospective descriptive study over a period of 1 year 6 months (April 2017 and Sept 2018), Total of patients included into this study were 25 who were assessed demographically in the department of ENT, Burdwan Medical College, Burdwan.

Results: Among all the branchial cleft anomalies, we encountered 3(12%) patients as first branchial anomalies, 20(80%) patients as second branchial anomalies and 2(8%) patients as third branchial anomalies. In 3 cases of first branchial anomalies, F:M=2:1, Right:Left=2:1, all 3 were the type II first branchial anomalies. In 20 cases of second branchial anomalies, 12 (60%) patients had branchial cyst, 6 (30%) patients had branchial sinuses and 2(10%) patients had branchial fistula. Thirteen(65%) of the 20 patients were right sided and 7(35%) were left sided. F:M=1:1 ; 12 (60%) patients were diagnosed and treated within the first age decade, 3 (15%) within the second age decade, 3 (15%) within the third age decade and 2 (10%) in the fourth age decade. Histological examination of the lesions after excision established the diagnosis in all the cases. In 2 cases of third and fourth branchial anomalies, Left sided Sinus tract found, both patients were Male.

Conclusion: Second branchial arch anomalies are the most common, accounting for 80% of all branchial anomalies. Branchial cyst are more frequently than sinuses and fistulae, no gender predilection but tend to occur more often on the right and majority of patients (approximately 60%) were diagnosed and treated during their childhood among second branchial anomalies. Among first arch anomalies, they are usually right sided with a female predominance and type II lesion are more common. Among third and fourth arch anomalies, they are usually left sided with a male predominance. Treatment for these lesions is complete surgical excision for prevent recurrences.

Key words: Branchial cys ; Branchial sinus; Branchial fistula,

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I. Introduction

The term branchial cyst was first used by Ascherson in 1832. He suggested that these cysts were results of impaired obliteration of branchial clefts [1]. By the end of the 4th week of embryonic life, the branchial arches (derived from neural crest cells) and the mesenchyma (derived from the lateral mesoderm) are easily recognizable. Five pairs of ectodermal clefts (grooves) and five endodermal branchial pouches separate the six arches, with a closing membrane located at the interface between the pouches and the clefts [2,3].

Anomalies of branchial derivation should always be considered in the differential diagnosis of a mass in the neck, particularly in children but also in adults. Such anomalies are second only to thyroglossal duct cysts as the most common masses of congenital origin & are the most common congenital masses presenting in the lateral neck [4]. These anomalies can manifest anywhere from the auricular region to the supraclavicular fossa, & most commonly located in the anterior neck, lateral to the midline & medial to the sternocleidomastoid muscle.

The surgical management varies depending on the cleft or pouch of origin & whether the anomaly is a cyst, sinus, or fistula. A detailed knowledge of the embryology of these lesions is therefore necessary for both definitive diagnosis & proper therapeutic intervention.

II. Materials And Methods

This retrospective descriptive study was carried out at ENT department of Burdwan Medical College & Hospital, Burdwan - a tertiary level hospital between April, 2017 to Sept 2018. Data obtained from the medical records of patients with branchial cleft anomalies in the Department of ENT, Burdwan Medical College & Hospital, Burdwan, from April, 2017 to Sept 2018. Parameters assessed were involvement of individual arches, anatomical types of lesions, the age and sex incidence, the site and side of predilection, the common clinical

features, the common investigations, treatment, and complications of the different anomalies as well as the histopathological examination of the excised pieces. In this study other causes of congenital masses of neck as thyroglossal duct cyst, dermoid cyst, thymic anomalies etc were excluded.

III. Observation

Among all the branchial cleft anomalies, we encountered 3(12%) patients as first branchial anomalies, 20(80%) patients as second branchial anomalies and 2(8%) patients as third branchial anomalies [Chart-1].

In 3 cases of first branchial anomalies, two (2) were female and one (1) was male. two (2) patient had right sided lesion and one (1) had left sided lesion. All 3 were type II first branchial anomalies [Figure-1].

In 20 cases of second branchial anomalies, 12 (60%) patients had branchial cyst [Figure-2], 6 (30%) patients had branchial sinuses [Figure-3], and 2(10%) patients had branchial fistula[Figure-4, Table -1]. Thirteen(65%) of the 20 patients were right sided and 7(35%) were left sided [Chart 2]. Male female ratio was equal [Chart-3]. 12 (60%) patients were diagnosed and treated within the first age decade, 3 (15%) within the second age decade, 3 (15%) within the third age decade and 2 (10%) in the fourth age decade [Table – 2].

In 2 cases of third branchial anomalies, both patients were male, had left sided lesion and presented with a sinus tract.

Histological examination of the lesions after excision established the diagnosis in all the cases.

IV. Discussion

At 5 weeks of gestation, the area of the developing face and neck of the embryo consists of five or six pairs of finger-like masses of tissue named the branchial arches [5]. The first arch forms the maxilla, mandible, incus, malleus, muscles of mastication, the anterior two-thirds of the tongue and part of the pinna. The first cleft gives rise to the external auditory canal and the lateral surface of the tympanic membrane [6].

Annot et al., divided the first branchial arch fistula into two types, type I and type II, the first being only posterior fistulas with communication, with the external acoustic canal with predominantly ectodermal component [7]. Type II is classified as one with anterior and posterior component and with an ectodermal and mesodermal component, with one track draining towards the deep lobe of parotid and a separate one draining towards the external acoustic canal.

Second branchial cleft anomalies are the most common, accounting for > 90% of Bas [8]. A persistent fistula of the second branchial cleft and pouch usually has its external opening in the neck near mid or lower part of SCM muscle, with an internal opening in to the oropharynx usually in the intratonsillar cleft of palatine tonsil. They can present as blind sinuses, solitary cysts, vestiges associated with cartilage remnants, or complete fistulae. Complete fistulae are rare, but when they occur, they are usually right sided and with a female predominance [9].

At least 75% of all second branchial cleft abnormalities are cysts [10], which typically present when an individual is between 10 and 40-years-old. Second branchial cleft fistulas and sinuses are less common and usually present during the first decade of life [11]. No gender predilection has been reported [12].

But, in our study approximately 40% of the patients had branchial sinuses (30%) and fistulae (10%) and the rest of 60% had branchial cysts. Besides, most of the patients belonged to the first (60%) decades and 65% (13) patient's anomaly was in the right side which is slightly different from the literature.

Third BAs are rare, accounting for only 2–8% of all Bas [13]. The fistula opening is seen in the lower neck and it passes along the carotid sheath and then passes between the glossopharyngeal and hypoglossal nerve, piercing the thyrohyoid membrane to enter pharynx in the region of pyriform fossa They are most commonly diagnosed in early childhood as acute suppurative thyroiditis or neck abscess, and approximately 90% occur on the left side of the neck [14].

Fourth arch anomalies were first described by Sandborn and Shafer in 1972 and are exceedingly rare, although there is recent evidence that their incidence may be somewhat higher than previously reported [15] All reported cases have been left sided, possibly reflecting the more complex anatomical development of the branchial tract on that side [16]. The fistula has its external opening into the lower part of neck near the SCM muscle and internal opening into the pyriform fossa.

Complete surgical excision is the definitive treatment for BAs. The surgical management varies depending on the cleft or pouch of origin & whether the anomaly is a cyst, sinus, or fistulae.

V. Conclusion

Branchial cysts are frequently incorrectly diagnosed and forgotten in the differential diagnosis of lateral neck swelling. It is better to use an intraoperative facial nerve monitoring in conjunction with a standard parotidectomy incision during surgical resection of first arch fistula. Second branchial anomalies are frequently diagnosed at the first and second decades of life and a standard step ladder approach is followed for excision of fistula. For the third and fourth arch anomaly, both the thyrohyoid (3rd pouch) & cricothyroid (4th pouch)

membranes need to be identified to determine the origin of the branchial pouch tract. An ipsilateral thyroid lobectomy may be necessary to identify the tract, especially if there has been previous inflammation with subsequent scarring.

VI. Tables, Charts and figures

Table – 1
Distribution of second branchial arch anomalies

	No of cases	Percentage (%)
Second branchial cysts	12	60
Second branchial sinuses	06	30
Second branchial fistulae	02	10
Total	20	100

Table – 2
Age distribution of second branchial cleft anomaly

Age	No of cases	Percentage (%)
0-10	12	60
11-20	03	15
21-30	03	15
31-40	02	10
>50	00	00
Total	20	100

Chart – 1
Distribution of various branchial arch anomalies

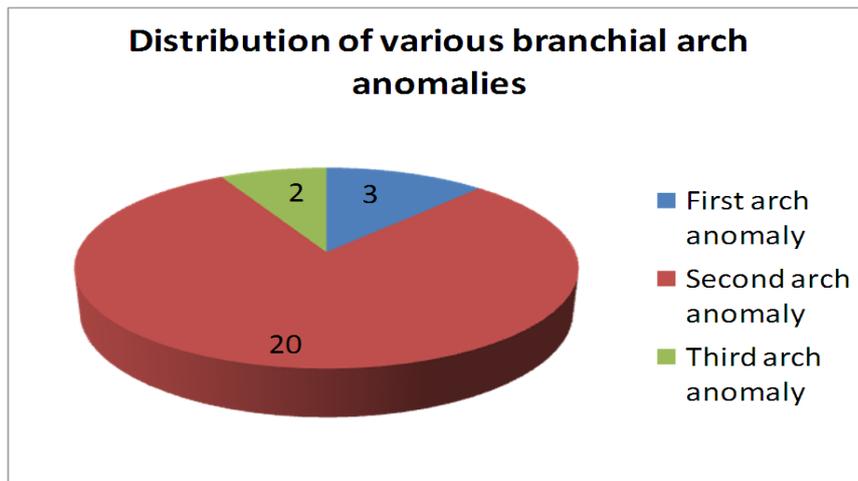


Chart – 2
Side distribution of second branchial arch anomalies

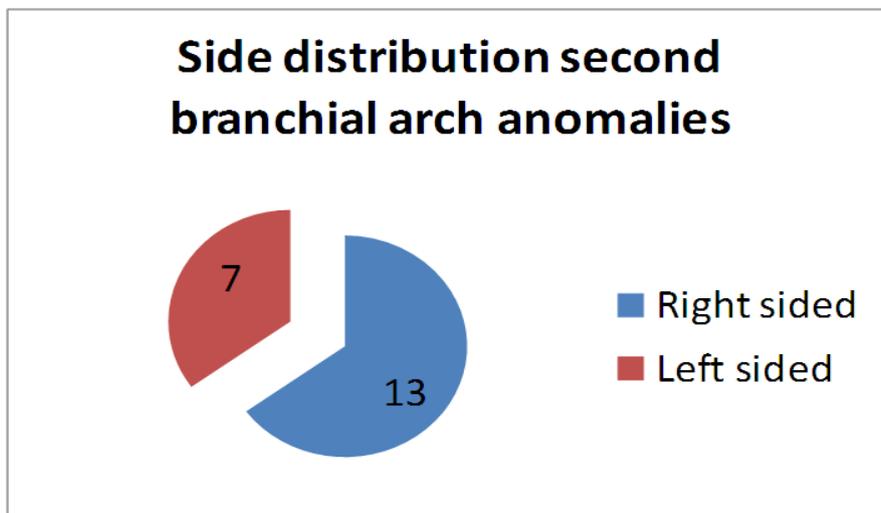


Chart – 3
Gender distribution of second branchial arch anomalies

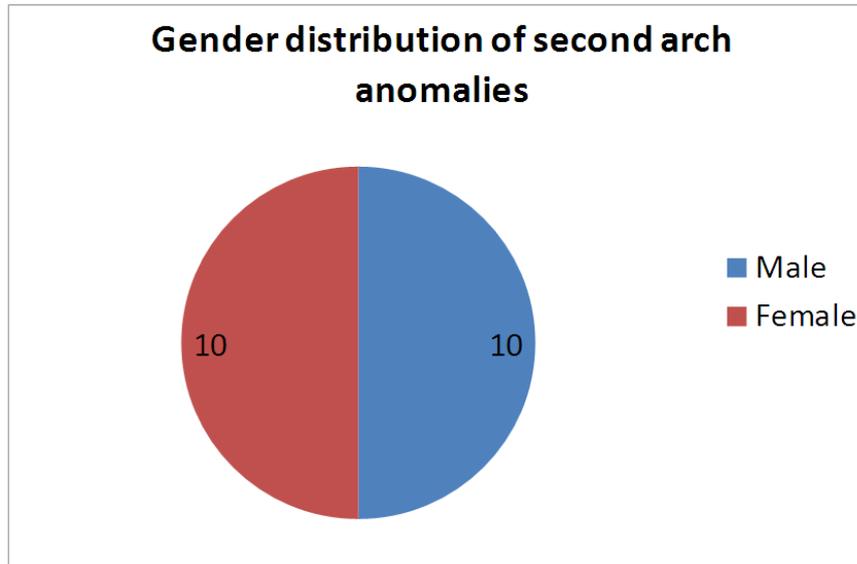


Figure – 1



First branchial arch Fistula

Figure – 2

Figure-2 (A,B,C,D) Surgical steps of second branchial cyst.



A) Left lateral neck region cystic SOL (7/4cm)



B) Cervicotomy for second branchial cyst



C) The specimen after excision



D) The specimen was cystic

Figure – 3

Figure-3 (A,B,C,D) Different surgical steps of second branchial sinus:

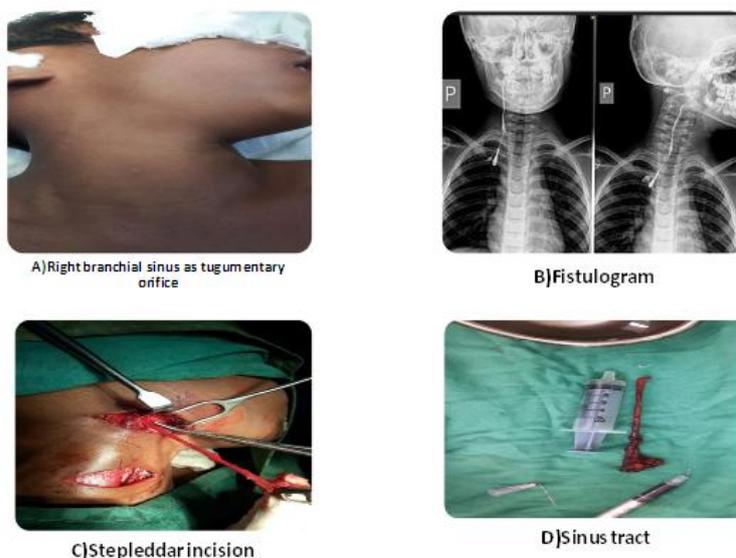
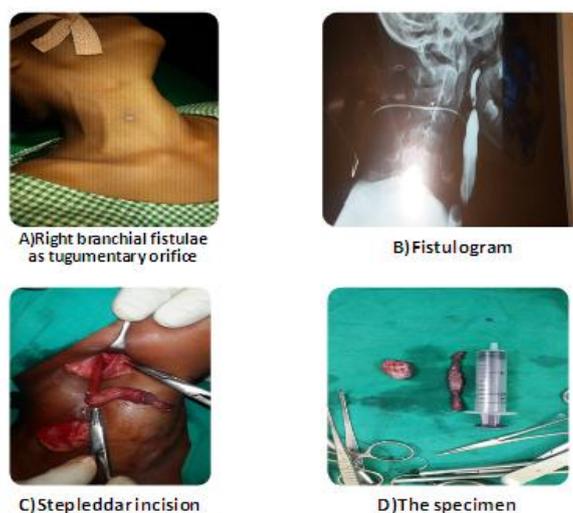


Figure – 4

Figure-4 (A,B,C,D) Different surgical steps of right branchial fistulae tract.



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