

Pearls and pitfalls in the management of branchial cyst

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Abstract

Introduction: Although branchial cysts may present as asymptomatic swellings, about one-third present acutely due to inflammation. The use of fine-needle aspiration biopsy (FNAB) and computerized tomography (CT) is controversial. The treatment of inflamed cysts is also controversial.

Aims: To compare the findings of FNAB and CT between cases of branchial cysts presenting as an asymptomatic swelling, and those presenting acutely due to inflammation, and to examine the management of infected cysts.

Materials and methods: Retrospective review of the medical records of 39 adult patients with histologically proven branchial cysts treated by the senior author (C.V.T.) between 1994 and 2003.

Results: Twenty-eight patients presented with an asymptomatic swelling. Eleven presented acutely with inflammation. A higher incidence of indeterminate fine needle aspirates and atypical CT features were found in the inflamed group. Initial treatment in the infected group consisted of intravenous antibiotics, followed by aspiration or surgical exploration in non-resolving cases. Interval excision after six weeks was performed in all inflamed cases without complication.

Conclusions: FNAB is recommended in all cystic neck lumps to rule out malignancy, but may be inconclusive, especially in inflamed cysts. Inflamed cysts are best treated with intravenous antibiotics, with or without aspiration or incision and drainage, followed by interval excision.

Key words: Branchial, infection, aspiration

Introduction

Branchial anomalies may exist as a cyst, a sinus, or a fistula. They are due to persistence of vestigial remnants of a branchial cleft or pouch.¹ The first recorded treatment of branchial cysts was by Langenbeck in 1855. He treated one by incision, and another by insertion of a seton.²

The majority present as asymptomatic neck swellings; however, around one third have been reported to present as rapidly enlarging masses due to inflammation.³ Investigations vary from solely clinical diagnosis,⁴ to the use of fine-needle aspiration biopsy (FNAB) and more involved radiology such as ultrasound and computed tomography (CT) scanning.⁵ The treatment of choice is surgical removal because of the natural history of increase in size and liability for infection.² Most of the reported series have included a mixture of all branchial anomalies, with little information given regarding the usefulness of radiological investigations or FNAB. The management of inflamed branchial cysts is another area which is not well described in the literature.

The objectives of the present study were: firstly, to compare the findings of FNAB and CT scanning in cases of branchial cysts presenting as asymptomatic swellings with those presenting acutely due to inflammation; and secondly, to examine the management of inflamed branchial cysts, and the outcome of this management.

Materials and methods

The medical records of all adult patients with a diagnosis of branchial cleft cyst undergoing surgery under the care of the senior author (C.V.T.) at the Royal Victoria Eye and Ear Hospital and St. James' Hospital, Dublin, Ireland, over a nine-year period between 1994 and 2003, were retrospectively reviewed. Patients were included only if they met the clinical criteria for diagnosis of a second arch branchial cleft cyst, and the diagnosis of branchial cyst was confirmed histologically.⁶ Patients with first arch branchial cleft cysts, or with cervical cysts in unusual locations, were thus excluded. Cases of cystic metastases masquerading as branchial cysts were also excluded. Data was collected regarding patient

TABLE I
DATA ON FINE NEEDLE ASPIRATION BIOPSIES

Findings	Inflamed group (<i>n</i> = 10)	Non-inflamed group (<i>n</i> = 24)	Total (<i>n</i> = 34)
Epithelial cells only	1	7	8
Epithelial cells and polymorpho- nuclear cells	3	8	11
Epithelial cells, polymorpho- nuclear cells, and cholesterol crystals	2	2	4
Cellular debris	1	1	2
Inconclusive aspirate	3	5	8
Squamous cell carcinoma	0	1*	1*

* False-positive

demographics, clinical features, radiological findings, fine-needle aspiration cytology findings, and pathological findings, as well as treatment administered, complications, and recurrence rate.

The patients were divided into those who presented with asymptomatic neck swellings, who were booked for elective surgery (non-inflamed group), and those who presented acutely with painful rapidly enlarging neck swellings, requiring emergency hospital admission (inflamed group). The radiological and pathological findings were examined with comparison of the two groups. In addition, the management of patients with inflamed branchial cysts, as well as the eventual outcome in these patients, was examined.

Results

Forty-one patients with a clinical diagnosis of branchial cyst were identified; of these two were considered to have first arch branchial anomalies, and were thus excluded, leaving 39 for analysis. Twenty-three (59 per cent) were female and 16 (41 per cent) were male. The patients' ages ranged from 16 to 52 years, with a mean of 30.3 years, and a median of 26 years. Twenty-three (59 per cent) of the cysts were left-sided. Twenty-eight patients (71.8 per cent) presented with typical features of an asymptomatic lateral neck swelling gradually increasing in size over a period of time ranging from four weeks to 18 months. Eleven patients (28.2 per cent) presented acutely with a rapidly enlarging painful swelling over a period of time ranging from

four days to six weeks and were admitted to hospital as emergencies.

FNAB was performed in 36 patients. Twenty-six of these were in the non-inflamed group, and 10 were in the inflamed group. Table I summarizes the FNAB findings in patients with inflamed and non-inflamed cysts. In six (60 per cent) of the patients with inflamed cysts, and in 19 (73 per cent) of the patients with non-inflamed cysts, the diagnosis of branchial cleft cyst was considered to be clearly supported by the finding of mature squames, with or without polymorphonuclear cells, and cholesterol crystals on FNAB. In one further patient in each group, the finding of cellular debris was considered to be consistent with a diagnosis of branchial cleft cyst. FNAB findings were reported as inconclusive in three (37.5 per cent) patients with inflamed cysts, and in five (19.2 per cent) patients with non-inflamed cysts. FNAB was reported as showing squamous cell carcinoma in one patient with a non-inflamed cyst; however this was subsequently found to represent a false-positive finding.

Microbiological culture of the aspirates of patients with inflamed cysts in every case failed to yield causative organisms.

Radiological studies were performed in nine patients with inflamed cysts, and in 13 patients with non-inflamed cysts. The radiological findings are summarized in Table II. Ultrasonography was performed in four patients (two with inflamed cysts, and two with non-inflamed cysts). Ultrasonography was not found to be helpful in making the diagnosis

TABLE II
RADIOLOGICAL DATA

Imaging tool	No. of patients	Findings				
		Branchial cyst	Abscess	Necrotic mass	Soft tissue mass	
CT scan	16	Asymptomatic	6	0	2	1
		Inflamed	0	5	2	0
MRI	2	Asymptomatic	2	0	0	0
		Inflamed	0	0	0	0
Ultrasound	4	Asymptomatic	0	0	0	2
		Inflamed	0	0	2	0

of branchial cleft cyst in any of these cases. CT scanning was performed in 18 patients (seven with inflamed cysts, and 11 with non-inflamed cysts). This demonstrated an abscess in five of the seven patients with inflamed cysts, and a necrotic mass in the other two. Among patients with non-inflamed cysts, CT scanning effectively demonstrated an anterior cystic neck swelling consistent with a diagnosis of branchial cyst in eight of eleven cases. Only two patients, both with non-inflamed cysts, underwent magnetic resonance imaging (MRI). In both cases, the presence of a cystic cervical swelling consistent with a diagnosis of branchial cleft cyst was effectively demonstrated.

All 28 patients with non-inflamed cysts underwent excision of the cyst as surgical treatment, and no complications were recorded. The initial treatment for the 11 patients with inflamed branchial cysts was hospitalization for intravenous antibiotics. With this treatment, resolution of the inflammatory process occurred in four patients. Four patients underwent aspiration of the contents of the inflamed cyst. In two patients, the inflammation subsequently resolved. The other two patients, along with the three others who failed to settle on antibiotics alone, proceeded to undergo surgical exploration of the mass. At surgery, the cysts were found to be adherent and impossible to resect completely without risking morbidity. Incision and drainage of the contents was thus performed, along with biopsy of the cyst wall. All 11 patients with infected cysts underwent interval excision at six weeks without complication (Figure 1).

Histopathological examination of the excised branchial cyst demonstrated squamous epithelium, with abundant lymphoid tissue in the cyst wall in 34 patients (87 per cent) and cholesterol crystals in four patients (10.25 per cent). None of the cases showed any evidence of malignancy, including the case in which FNAB had been reported as showing squamous cell carcinoma.

Discussion

The age distribution, and the laterality of the cysts in the present series are similar to those reported by others.^{2,7} However, although other authors have reported branchial cysts to be more common in men, most of the patients in the present series were women.^{2,8}

Branchial cysts most commonly present as asymptomatic neck swellings; however, acute presentation with a rapidly enlarging painful neck mass due to inflammation may also occur. Fleming reported infection to be the presenting feature in nine of 26 (35 per cent) patients with branchial cysts.³ A similar incidence of acute presentation with inflammation (28 per cent) was found in the present series.

Cystic neck lumps may present a challenge to the head and neck surgeon. The commonest cause of a cystic neck lump is a branchial cyst; however, cystic metastases from squamous cell carcinoma of the head and neck, or from papillary carcinoma of the thyroid, may also occur, and may masquerade as a branchial cyst.⁹⁻¹³ Accurate diagnosis of cystic neck lumps is thus of significant importance. However, excision of a neck lump of unknown aetiology is generally considered to be contraindicated, as this practice has been shown to have an adverse impact on outcome in cases where the lump transpires to be metastatic.¹⁴

Fine needle aspiration biopsy (FNAB) is of proven utility in the diagnosis of solid neck lumps, and does not violate the neck.¹⁵ However, the efficacy of this procedure in the diagnosis of cystic neck masses is less clear. The cytological features of branchial cysts include mature squamous cells, cellular debris, lymphocytes and macrophages.¹⁶ Previous authors have reported the sensitivity of FNAB in the detection of malignancy in cervical cysts to be poor; however, the numbers of patients undergoing this procedure in these studies were small.¹⁰⁻¹³ A recent paper reported FNAB to have a sensitivity of 73 per cent in the diagnosis of any type of cystic cervical metastasis, and a sensitivity of 60 per cent in the diagnosis of cystic metastases masquerading as branchial cleft cysts.⁹ False-negative aspirations commonly arise due to hypocellular or insufficient aspirates,¹⁶ and are reported to be less likely when part of the cyst wall is included in the aspirate.¹⁷ The use of flow cytometry to detect aneuploidy has also been suggested to improve sensitivity.¹⁸ False-positive aspirates may also occur, as was the case in one of our patients. This is commonly due to cytological atypia on account of inflammation and regeneration.¹⁷ In general, false-positive findings are reported to be rare.¹⁶

In the present series, 25 of 36 patients had FNAB findings which were considered to be strongly supportive of a diagnosis of branchial cyst (mature squamous cells, polymorphonuclear cells, and cholesterol crystals), with two others having findings considered to be consistent with a diagnosis of branchial cleft cysts (cellular debris with no evidence of malignant cells). FNAB findings were inconclusive in eight patients. A higher incidence of inconclusive findings was found in patients with inflamed cysts. We believe, given the high false negative rate of FNAB in the diagnosis of cystic neck lumps, that a biopsy of the cyst wall should be sent for histological examination at the time of surgical incision and drainage in all cases. Finally, definitive exclusion of

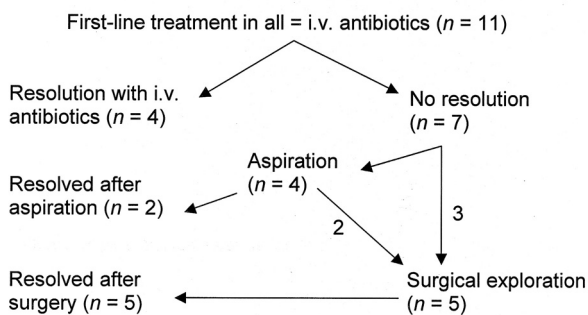


FIG. I
Treatment of inflamed cysts.

malignancy is possible only after interval excision of the cyst, therefore, if this is not to be undertaken, further investigations (repeat FNAB, endoscopy) should be considered.

- **Branchial cysts commonly present as asymptomatic swellings unless they are secondarily inflamed**
- **In this retrospective study the findings at fine needle aspiration and on CT scanning are presented in these two sub-groups**
- **Patients presenting with inflammation tended to have indeterminate findings on FNAB as well as atypical CT findings. This latter group was treated, as would be expected, with interval excision after antibiotics**

FNAB was falsely positive for malignancy in one patient who presented with an asymptomatic neck swelling. This patient subsequently underwent endoscopy and surgery under frozen section control; however, histological examination of the resected cyst showed no evidence of malignancy, and the patient has remained well without appearance of head and neck cancer for over five years. However, it should be borne in mind that 10–24 per cent of patients presenting to the head and neck surgeon with a presumed diagnosis of branchial cyst transpire to have a cystic metastasis,^{9–13} and this proportion is higher in older patients.^{9,11,13} Fibre-optic examination of the upper aerodigestive tract as well as FNAB of the neck lump is mandatory before surgery in all cases of branchial cysts prior to surgery. In older patients, or where a clinical suspicion of malignancy exists, consideration should be given to performing endoscopy with directed biopsies / tonsillectomy prior to surgery, and to performing the operation under frozen section control, with consent for a radical neck dissection, even in cases where FNAB is negative.^{12,19}

It has been reported that the use of CT scan and ultrasound may improve diagnostic accuracy and anatomic definition.⁷ In our experience, CT scanning is particularly useful in cases of infected branchial cysts, in order to exclude deep neck space infection. Only two patients in our series were evaluated with MRI, so we are unable to make any definitive statement regarding this imaging tool.

The management of inflamed branchial cysts has not been addressed in any of the previous literature. These cases may pose a significant dilemma to the surgeon. Such cases in the present series were generally treated initially with intravenous antibiotics. In those cases where the inflammation persisted, aspiration of the cyst contents was found to permit resolution of the inflammatory process with continuation of the use of intravenous antibiotics in many cases. Incision and drainage was thus reserved for cases where

inflammation persisted in spite of maximum antibiotic treatment, with or without aspiration. In all cases, formal excision was undertaken after an interval of six weeks. This was performed in all cases without any complications or recurrence. It has been our experience that complete surgical excision of infected branchial cysts is technically difficult, owing to the difficulty in identifying tissue planes for dissection, and also because such dissection is associated with higher risk of incomplete excision. On the other hand, interval excision was safe and effective and without any additional morbidity.

Conclusions

FNAB is a useful investigation in patients presenting with cystic neck lumps; however, there is a higher incidence of inconclusive aspirates in patients presenting acutely due to inflammation. Acutely inflamed cysts are best treated with intravenous antibiotics with or without aspiration or incision and drainage followed by interval excision.

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