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Paediatric neck masses – a diagnostic dilemma

A. A. P. CONNOLLY*, K. MACKENZIE*†

Abstract

Three hundred and sixty children who had a head and neck mass excised during 1987 to 1992 at the Royal Hospital for Sick Children, Glasgow were studied. There were 210 males and 150 females with a mean age of 60.7 months (0.5 to 198 months). Pilomatrixomata/sebaceous cysts (34 per cent), thyroglossal cysts (13 per cent), branchial remnants (nine per cent) and dermoids (nine per cent) accounted for almost two-thirds of the 264 non-lymphadenomatous benign lesions excised. Ninety-three lymphadenopathy masses consisted of 60 with reactive hyperplasia, 21 with *Mycobacterium* infection and 12 lymphomas. There were three solid malignant tumours, two were rhabdomyosarcomata and one disseminated round cell tumour. The correlation between clinical diagnosis and histopathology of benign non-lymph node masses and solid tumours was 90 per cent and 100 per cent respectively, in benign lymph nodes, 66 per cent, but was poor in differentiating lymph node content. The mean time from presentation of a swelling to its excision was almost a year and the mean in-patient stay for excision of a mass was almost five days. The role of fine needle aspiration cytology (FNAC) in arriving at a diagnosis and reducing patient morbidity is discussed.

Key words: Head and neck neoplasms; Surgery; Paediatrics; Histology; Biopsy, needle

Introduction

Although neck swellings in children are common, the vast majority are reactive lymph nodes arising in association with upper respiratory tract infections. The natural history of these nodes is gradual resolution when the primary focus of the disease resolves. Concern arises, however, if a neck swelling persists as this might suggest pathological involvement of a group of lymph nodes, for example by lymphoma or alternatively a neck mass arising from tissue other than a lymph node, e.g. a branchial cyst (Zitelli, 1981).

Currently, if a child presents with a neck lump a decision is made, regarding the need for excision, based on the history and characteristics of the swelling. If the mass is thought to be benign and non-lymphadenomatous then in general it will be excised. This will not only allow a diagnosis to be made but in the majority of cases will also definitively treat the condition. If there is a non-lymphadenomatous mass of possible malignant pathology then open biopsy is carried out.

The area of residual clinical dilemma is the diagnosis of those children with lymphadenopathy. The frequency of non-specific, benign, transient, lymphadenopathy in children is extremely high (Zueler and Kaplan, 1975). The incidence of therapeutically significant lymphadenopathy requiring biopsy for diagnosis and treatment is conversely very low (Lee *et al.*, 1980). The clinical history and examination have a limited capability in distinguishing between malignant and benign lymphadenopathy. In the past, lymph node size, tenderness, location relative to sternocleidomastoid muscle, consistency, rate of growth, fever, weight loss, presence of upper respiratory tract infections, erythrocyte sedimentation rate (ESR) and the nature of the chest X-ray have been used to try to select patients for excisional biopsy (Greenfield and Jordan, 1978; Lake and Oski, 1978; Knight *et al.*, 1982; Slap *et al.*, 1986). Application of this work has improved the clinician's ability to select those patients in whom a biopsy would yield useful information. Nevertheless, there remains a significant number of patients with suspicious lymphadenopathy in whom it is not clear if surgical excision is warranted. The principal differential diagnoses are reactive, tuberculous, either typical or atypical, or lymphomatous lymph nodes. As most patients with no other signs or symptoms will be thought to have reactive lymphadenopathy, then a period of observation will be initiated in most instances. Following this, if the lymphadenopathy persists, or gets worse, then the lymph node mass is excised or at the very least there is an incisional biopsy. There are several problems with this

From the Departments of Otolaryngology – Head and Neck Surgery, Glasgow Royal Infirmary*, and the Royal Hospital for Sick Children†, Glasgow, UK.
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TABLE I
THE HISTOPATHOLOGY OF THE NON-LYMPHADENOMATOUS BENIGN LESIONS EXCISED (n = 264)

	Number
Pilomatrixoma/sebaceous cyst	91 (34%)
Thyroglossal cyst	34 (13%)
Branchial remnant	25 (9%)
Dermoid	23 (9%)
Granuloma	19 (7%)
Cystic hygroma	14 (5%)
Salivary gland	10 (4%)
Haemangioma	11 (4%)
Lipoma	8 (3%)
Neurofibroma	5 (2%)
Other	24 (9%)
Total	264 (100%)

strategy. Firstly, the period of observation means that inevitably there is anxiety for the patients and parents while they await the outcome. Secondly, most cases will have an open biopsy excision of the mass to establish the diagnosis. This will result in the need for a general anaesthesia in most cases and the potential surgical morbidity associated with a neck wound.

The management strategy in adults is somewhat different for several reasons. Firstly, children present with reactive cervical lymph nodes more frequently than adults. Secondly, primary or secondary malignant involvement of lymph nodes is reasonably common in adults whereas it is rare in children and thirdly, adult patients can comply with FNAC (Frable, 1976; Russ *et al.*, 1978; Frable and Frable, 1982; Stani, 1987; Birchall *et al.*, 1991). In FNAC a core of tissue is aspirated from the mass using a needle (size 21 FG) and syringe, air and alcohol dried on a slide, and analysed by a cytologist. The sensitivity and specificity of the technique in differentiating between patients with lymph nodes containing squamous cell carcinoma, tuberculosis, lymphoma and reactive lymphoid tissue are high. It is quick, often with a report either in the clinic (Eisele *et al.*, 1992) or same day, and so patients can be advised of the provisional diagnosis almost immediately. Use of this technique allows more rational planning of further investigations and/or surgery. It is therefore currently accepted that FNAC has a beneficial role in the management of adults presenting with lumps in the head and neck (Tao *et al.*, 1980; Young *et al.*, 1981; Mobley *et al.*, 1991; Obers and Phillips, 1991).

In children this is not so clear. North American literature (Schaller *et al.*, 1983; Schulterover *et al.*, 1984; Taylor and Nuney, 1984; Towbin and Strife, 1985; Wakely *et al.*, 1988; Cohen *et al.*, 1989; Liu *et al.*, 1989; Schelkun and Grundy, 1991; Silverman *et al.*, 1991; Callender *et al.*, 1992; Derias *et al.*, 1992; Wakely, 1992) is generally supportive but most studies have low numbers and it could well be that support for the use of the technique is principally economically driven (Kocjan, 1990; Meyers and Eiseman, 1990).

In summary, the dilemma which arises regarding the diagnosis and management of a persistent neck mass may result in anxiety, not only for the clinician, but more importantly, for the patients and parents.

The aims of this study are to characterize in a general paediatric population firstly, the histological diagnoses of excised neck masses; secondly to determine the accuracy of the pre-operative clinical diagnosis; and thirdly to assess the out-patient and in-patient workload of arriving at a diagnosis. Finally, an alternative strategy for the management of paediatric head and neck masses will be discussed.

Methods

The details of all patients who had head and neck masses excised at the Royal Hospital for Sick Children, Glasgow, from 1987 to 1992 inclusive, were noted from the theatre log books. The case notes were obtained and the following patient data were obtained: age, sex, duration of the swelling, antibiotic prescription, time from GP referral until being seen in the out-patient clinic, number of pre-operative out-patient visits, provisional diagnosis, investigations performed, time from first out-patient visit to operation, length of in-patient stay, complications of surgery, final histological diagnosis, number of post-operative visits.

Results

Three hundred and sixty head and neck masses were excised from children during 1987 to 1992 at the Royal Hospital for Sick Children, Glasgow. There were 210 male and 150 female patients with a mean age of 60.7 months (range 0.5 to 198 months).

The distribution of the histological diagnoses of the 264 non-lymphadenomatous benign lesions is shown in Table I. Ninety-three lymphadenopathy masses consisted of 60 with reactive hyperplasia, 21 *Mycobacterium* infections and 12 lymphoma; of the three solid malignant tumours, two were rhabdomyosarcomata and one disseminated round cell tumour.

TABLE II
COMPARISON BETWEEN PRE-OPERATIVE CLINICAL DIAGNOSIS AND FINAL HISTOLOGY

	Final histology	Correct diagnosis	Percentage correct
Benign non-lymph node lesions	264	246	90
Benign lymph nodes	81	54	66
Reactive LN	60	18	30
Mycobacterium LN	21	6	29
Lymphoma	12	6	50
Solid malignant tumours	3	0	100

TABLE IIIA and B
THE OUT-PATIENT AND IN-PATIENT WORKLOAD INVOLVED IN ARRIVING AT A DIAGNOSIS

(A)	Mean time (months)	Range
Appearance of lump until GP referral	7	0 – 54
GP referral until out-patient appointment	2.2	0 – 23
Out-patient appointment until lump excision	2.4	0 – 24
Appearance of lump to its excision	11.6	0.3 – 64
(B)	Mean	Range
In-patient stay (days)	4.9	1 – 101
Out-patient visits pre-operatively	1.6	0 – 6
Out-patient visits post-operatively	2.3	0 – 19

The pre-operative provisional clinical diagnosis correlated with the final histological diagnosis in 246 (90 per cent) of the benign non-lymph node cases; 54 (66 per cent) of the benign lymph node cases; 18 (30 per cent) of the reactive lymph node cases; six (29 per cent) of the *Mycobacterium* cases; six (50 per cent) of the lymphoma cases; and three (100 per cent) of the solid tumours (Table II). From this it can be concluded that clinical diagnosis of benign non-lymph node masses and solid tumours is good, benign lymph nodes is reasonable, but of lymph node content is poor.

To illustrate the overall workload and time involved in the excision of paediatric neck masses, Table IIIA demonstrates the time involved at each stage and Table IIIB the in-patient and out-patient activity. As one of the areas of possible alteration of the current management is in those patients with lymphadenopathy, the characteristics of the workload involved in arriving at a diagnosis in these children is displayed in Table IV. From this it can be seen that those patients with benign disease had noticed the lump for, on average, more than nine months, and even those with lymphoma had noted it for more than three months. There is potential morbidity associated with the excision of the head and neck swellings and the distribution of the types of complication in the various categories of final diagnosis is demonstrated in Table V.

Discussion

From the characterization of the paediatric neck lumps excised in the last six years, it can be seen that approximately three-quarters are benign neck masses and the remaining quarter lymph nodes, with fewer than one per cent being solid malignant tumours.

The management of simple benign neck masses is generally excision of the mass. Although in this study, the pre-operative diagnosis of a 'benign neck mass' was correct in 90 per cent of cases, the histological diagnosis correlated in only 45 per cent. This is probably not of great significance as all of these neck masses had to be excised as part of their definitive management. Equally in the very small number where malignant disease was suspected an incisional biopsy was necessary. The area of residual dilemma was how to determine the histology in those patients with lymphadenopathy.

It is in this group of patients that FNAC could be of potential value. It is surprising that the use of FNAC in children has not been more widely evaluated considering previous reports of its potential benefit, e.g. in diagnosing lymphadenopathy (Kardos *et al.*, 1989), as a diagnosis and therapeutic procedure for children with fluctuant lymph nodes (Fleisher *et al.*, 1984), and as a method of obtaining material for bacteriological culture (Barton and Feigin, 1974).

In this study, the main cause of lymphadenopathy was reactive lymph nodes but a significant proportion was due to atypical *Mycobacterium* infection and a smaller proportion due to lymphoma (Lincoln and Gilbert, 1972). The ideal management of these patients would be to correctly detect the atypical *Mycobacterium* infection and lymphomas prior to definitive medical and surgical treatment, whereas those patients with reactive nodes could be reassured without recourse to excisional biopsy.

TABLE IV
CHARACTERISTICS OF THE CHILDREN WITH LYMPHADENOPATHY (n = 93)

	Reactive	*Mycobacterium*	Lymphoma
n	60	21	12
Age (months)	59.1	62.9	94.8
Male : female	38 : 22	7 : 14	9 : 3
Appearance of lump until GP referral (months)	11.3	3.7	3.8
GP referral until out-patient appointment (months)	2.1	1.2	0.75
Out-patient appointment until excision (months)	2.4	1.2	0.72
Appearance of lump to excision (months)	15.8	6.1	4.3
In-patient stay (days)	2.5	5.3	24.5
Pre-operative out-patient visits	1.6	1.9	0.25
Post-operative out-patient visits	1.4	3.3	8.2

TABLE V
COMPLICATIONS ASSOCIATED WITH EXCISION OF HEAD AND NECK MASSES (N = 360)

	Non-malignant lymphadenopathy (n = 81)	Benign cases (n = 264)	Malignant cases (n = 15)
Wound infection	3	1	
Haematoma	6	3	
Hypertrophic scarring	6 (re-op 3)	8 (re-op 1)	
Recurrence	9 (re-op 6)	3 (re-op 3)	
Oedema		1	
Sternomastoid release		1	
Nerve palsy		2	1
Total	21 (25%)	19 (9%)	1 (7%)

Those with atypical *Mycobacterium*-infected lymph nodes were identified pre-operatively, in only six of the 21 cases in this series. This was probably due to the low index of suspicion of atypical *Mycobacterium* in this group, only nine of the 21 cases had a Mantoux or Heaf test performed. FNAC can diagnose atypical mycobacterial lymphadenopathy and, with the use of stains and culturing, the subtype may be characterized (Bottles *et al.*, 1986). If these atypical mycobacterial lymph nodes had been diagnosed correctly then it is conceivable that they could have been treated exclusively by complete surgical excision as recommended by Schaad (Schaad *et al.*, 1979). This could have avoided the use of antituberculous drugs and recurrence of the mycobacterial lymphadenopathy, which was approximately 25 per cent in this series.

Of those patients with lymphoma, it was strongly suspected pre-operatively in six of the 12 cases whereas in the others the diagnosis was only made once the lymph node had been excised. As can be seen from this study, there is frequently significant delay from the time of noting the neck lump by the patient or parent to the actual time of excision and diagnosis. This effectively means a potential delay in instituting management of a lymphoma. It is likely that with the use of FNAC, earlier suspicion of such a lymphoma would have occurred and so excision biopsy could have been performed at an earlier stage and management instituted sooner (Friedman *et al.*, 1980).

Reactive lymph nodes were found in at least two out of three of the patients with lymphadenopathy and so FNAC and the correct identification of such lymph nodes could have prevented unnecessary removal of these nodes. The potential problems with FNAC are that it is dependent on two main variables, firstly, the taking of the aspirate by the operator and secondly, the interpretation of that aspirate by the cytologist. Associated with each of these is a learning curve, so to maximize the sensitivity and specificity of the test in diagnosing the histology of lymphadenopathy the number of people carrying out the aspiration and interpretation of the specimen have to be minimized. Ideally, this would mean one person for both aspects or, at the most, one aspirator and one interpreter. In the adult population, sensitivity and specificity in excess of 90 per cent can be achieved once each of these aspects has been addressed. A similar level would have to be achieved in a paediatric practice for FNAC to be a viable proposition.

Ideally, one would wish every child who presented with a neck mass to be seen by a multidisciplinary medical team. However in this series, although it only addressed those masses which were excised and not the 'universal' referred neck mass population, it is clear that even in a regional centre there would only be a few cases per week and of these approximately one would require excision for diagnosis. Although it is unlikely that such a multidisciplinary team would be convened, what could be achieved is the establishment of an FNAC facility using either local anaesthetic techniques such as EMLA or under a day-case general anaesthetic facility. Clearly in the early stages such a strategy would have to be evaluated by comparison with the histological diagnosis of the excised mass.

From the analysis of these paediatric neck lumps, it would appear that FNAC could have a potential role in the diagnosis of paediatric neck lumps and, in particular, the sub-group of patients who have lymphadenopathy. To more accurately determine the role of FNAC in a paediatric population, prospective evaluation is required. If the potential promise of this technique is borne out then it could reduce the surgical morbidity and time delay involved at arriving at diagnosis of children presenting with lymphadenopathy.

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Address for correspondence:
Mr K. MacKenzie, M.B., Ch.B., F.R.C.S.,
Department of Otolaryngology – Head and Neck Surgery,
Royal Infirmary,
Glasgow G31 2ER.

Fax: 0141-211-4896