



## Routine histological examination of epidermoid cysts; to send or not to send?



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### HIGHLIGHTS

- Epidermoid cysts are common but malignant transformation extremely rare.
- Good association between a clinical diagnosis and a final pathology diagnosis of epidermoid cyst.
- Intra-operative transection of resected specimen may improve confidence in diagnosis.
- Where classical features are present clinically and on excision, the specimens do not require histological examination.

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### ABSTRACT

**Background:** The diagnosis of epidermoid cyst is seldom in doubt, and associated malignancy extremely rare, yet it is commonplace for the lesion to be sent to the pathology laboratory for analysis. The aim of this study was to evaluate our current practice with regards to diagnostic accuracy among clinicians, and assess risk of not routinely sending suspected epidermoid cysts for histological examination. Potential cost savings were also estimated and calculated.

**Methods:** Retrospective analysis of clinical and pathology data on all suspected epidermoid cysts excised from a Scottish district general hospital over a 5-year period between January 2011 and October 2015.

**Results:** Five hundred and thirty-six suspected epidermoid cysts were excised during the study period. Three hundred and ninety-six were sent for histological examination which confirmed a diagnosis of epidermoid cyst in 303 (76.5%) cases. There was good agreement between preoperative suspicion and final histological diagnosis: 80.8% (257/318) among referring clinicians, 81.9% (289/353) among reviewing surgeons, and 88.4% (243/275) where there was preoperative agreement between both. There were no malignant lesions. An average of 80 clinically apparent epidermoid cysts were excised and sent for histology each year at a cost of £4800 per annum.

**Conclusion:** There was close agreement between clinical and final histological diagnosis of epidermoid cyst. Where a characteristic, odorous, toothpaste-like material is present on transection intra-operatively, the diagnosis is confirmed and the lesion can be discarded. We argue that significant cost savings can be achieved by adopting this approach.

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## 1. Introduction

Epidermoid cysts (often incorrectly referred to as sebaceous cysts) [1] are among the most commonly encountered benign

cutaneous lesions referred for surgical excision. They are commonly found on the scalp, face, and trunk but may also occur on the limbs and genitals. The quiescent, non-infected cyst is best treated by surgical resection of the intact cyst under local anaesthesia, ensuring no residual cyst wall remains as this increases the risk of recurrence [2]. There is anecdotal evidence to suggest an intra- and inter-departmental variation in surgical practice when clinically apparent benign skin lesions, including epidermoid cysts, are excised [3]. While some routinely request histological examination

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of these specimens, others are confident enough in the clinical diagnosis to discard such specimens in the absence of concerning features. The practice of routine histological examination of epidermoid cysts may therefore incur an additional cost with no consequent benefit to patient care or prognosis. With finite healthcare resources, this brings into question the justification for such practice.

The aim of this study was to evaluate our current practice with regards to diagnostic accuracy in primary as well as secondary care settings, and assess risk of not routinely sending suspected epidermoid cysts for histological examination. Potential cost savings were also estimated and calculated.

## 2. Methodology

### 2.1. Study design and patient selection

A retrospective cohort study was conducted of all consecutive skin lesions excised within a Scottish district general hospital (Dumfries and Galloway Royal Infirmary) and its associated community hospital (Galloway Community Hospital) over an approximate 5-year period between January 1st, 2011 and October 1st, 2015. Majority of patients were referred by their General Practitioners (GPs), as is standard practice within the UK. Patients were then reviewed in the outpatient clinic by Consultant or non-Consultant (trainee) surgeons prior to excision. Surgical teams included General, Maxillofacial, Orthopaedic and Gynaecological surgeons.

We included patients with suspected epidermoid cysts, clinically diagnosed by General Practitioners (GP) and/or reviewing Surgeons in the outpatient clinic, who underwent excision. Demographic data and operative details were collated including referral details, clinical diagnosis, surgical specialty, and grade of surgeon reviewing in clinic as well as grade of the operating surgeon. All patients were crosschecked in our pathology database to ascertain whether specimens had been sent for histological examination and the final diagnosis compared with preoperative diagnoses.

Patients excluded from the study were those suspected to have an alternative diagnoses by both the referring GP and reviewing Surgeon in the outpatient clinic.

The cost of routine histological examination was calculated based on unit pricing for the analysis of each specimen. The unit cost of analysis in our NHS trust is £60 which lies well within the UK price range of £50–£90 [4].

### 2.2. Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics software 23.0. Continuous data were summarized as mean and median while categorical data in frequencies and percentages. Cross tabulations were performed where relevant with Chi-square and Fisher's Exact tests used to evaluate statistical significance defined as  $p < 0.05$ .

## 3. Results

Five hundred and thirty-six suspected epidermoid cysts were excised between January 2011 and October 2015. Patient demographics and intraoperative details are shown in Table 1. The median age of patients included in the study was 50 years (range 3–89). An equal proportion of males and females was noted within the study group – 278 (51.9%) males and 258 (48.1%) females. Eighty-two percent of patients were operated on by general surgeons.

**Table 1**  
Patient demographics, and operative details.

	No. of patients <sup>b</sup> (n = 536)
Age (Years) <sup>a</sup>	50 (3–89)
Sex	
Male	278 (51.9)
Female	258 (48.1)
Grade of operating surgeon	
Consultant	261 (48.7)
Non-consultant	275 (51.3)
Surgical specialty	
General surgery	441 (82.3)
Oral and Maxillofacial surgery	67 (12.5)
ENT	18 (3.3)
Orthopaedic surgery	9 (1.7)
Gynaecology	1 (0.2)

<sup>a</sup> Values are median (range).

<sup>b</sup> With parentheses in percentages unless otherwise stated.

Four hundred and thirty-nine (81.9%) lesions were suspected by the referring clinician to be epidermoid cysts, 486 (90.7%) by the reviewing surgeon in clinic, and in 389 (72.6%) cases there was agreement on the diagnosis by both.

Three hundred and ninety-six (73.9%) of all excised lesions were sent for routine histological examination largely based on operating surgeon preference. There was no statistically significant difference observed in consultant versus non-consultant grade surgeons' likelihood to request routine histological examination. Of the 261 lesions excised by consultant surgeons, 189 (72.4%) were sent to the pathologists as compared with 207 out of 275 (75.3%) excised by non-consultant surgeons,  $p = 0.51$ .

There were 303 (76.5%) confirmed epidermoid cysts on final pathology (Fig. 1). The most common diagnosis of the 93 excised non-epidermoid cyst lesions histologically examined were lipomas (28%  $n = 26$ ). Others included 13 (14%) pilomatrixoma, and 7 (7.5%) dermatofibroma. There were no malignant lesions.

Of the 140 suspected epidermoid cysts excised which were discarded, we assessed the preoperative suspicions. One hundred and fourteen (81.4%) were suspected by both the referring clinician and assessing surgeon in clinic to be an epidermoid cyst.

We followed up all patients up to February 2016 by checking electronic GP referral records and accessing additional pathology records. There were no further referrals or pathology reports suggesting no disease recurrence or skin malignancy in this cohort of patients (**median follow-up = 38.8months**).

### 3.1. Accuracy of clinical diagnosis

From the primary care setting, 318 cases referred by GPs as suspected epidermoid cysts were sent for pathological confirmation following surgical excision. Two hundred and fifty-seven (80.8%) were confirmed as epidermoid cysts and the remaining 61 (19.2%) as an alternative diagnosis ( $\chi^2 = 16.02$ ,  **$p < 0.001$** ) (Fig. 2A).

In secondary care, of 353 suspected epidermoid cysts sent for pathology, 289 (81.9%) were correctly diagnosed clinically by the assessing surgeon. The remaining 64 (18.1%) were other benign lesions ( $\chi^2 = 49.2$ ,  **$p < 0.001$** ) (Fig. 2B). The grade of assessing surgeon in clinic had no impact on the likelihood of the diagnosis being correct. Eighty two percent (194/238) of consultants diagnosed epidermoid cysts correctly compared to 83% (95/115) non-consultants ( $\chi^2 = 0.01$ ,  **$p = 0.9$** ).

Where both the referring GP and assessing surgeon agreed on a clinical diagnosis of epidermoid cyst, 243 (88.4%) of the 275 lesions sent for histological examination were confirmed as epidermoid

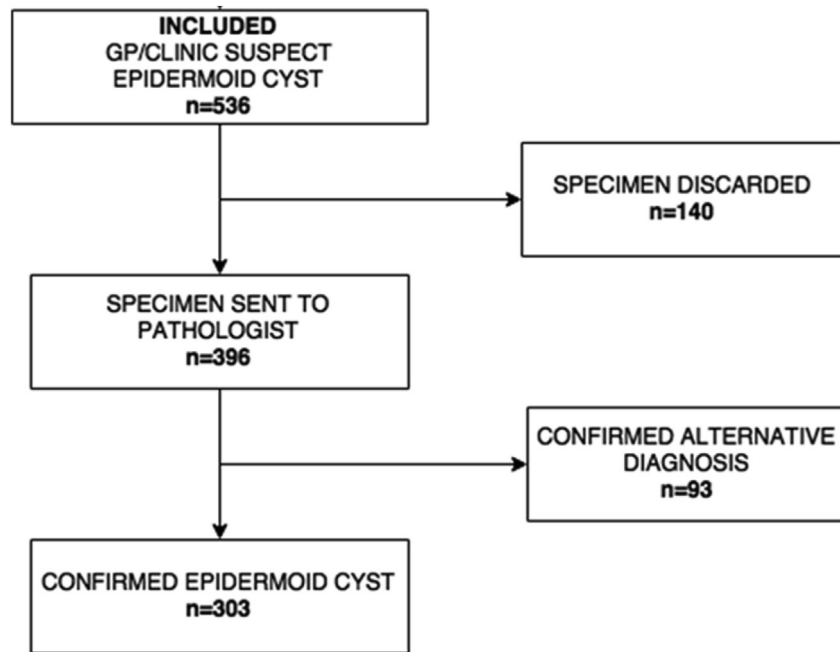


Fig. 1. Study design (GP - General Practitioner).

cysts (Fig. 2C). Here, only 32 (11.6%) had an alternative diagnosis of other benign skin lesions.

### 3.2. Cost analysis

The cost of processing a small cutaneous lesion ranges from £50–£90 [4]. Within our healthboard, this cost is set at £60. An average of 80 clinically apparent epidermoid cysts were excised and sent for pathological evaluation each year at a cost of £4800 per annum. To assess the national impact of this practice, we extrapolated based on our catchment population of 150,000 people – 0.25% of the UK population. Assuming similar practices across the UK [3,5], the cost implication of routine histological examination of epidermoid cysts is estimated at £1.9million per annum, representing a significant potential cost saving.

## 4. Discussion

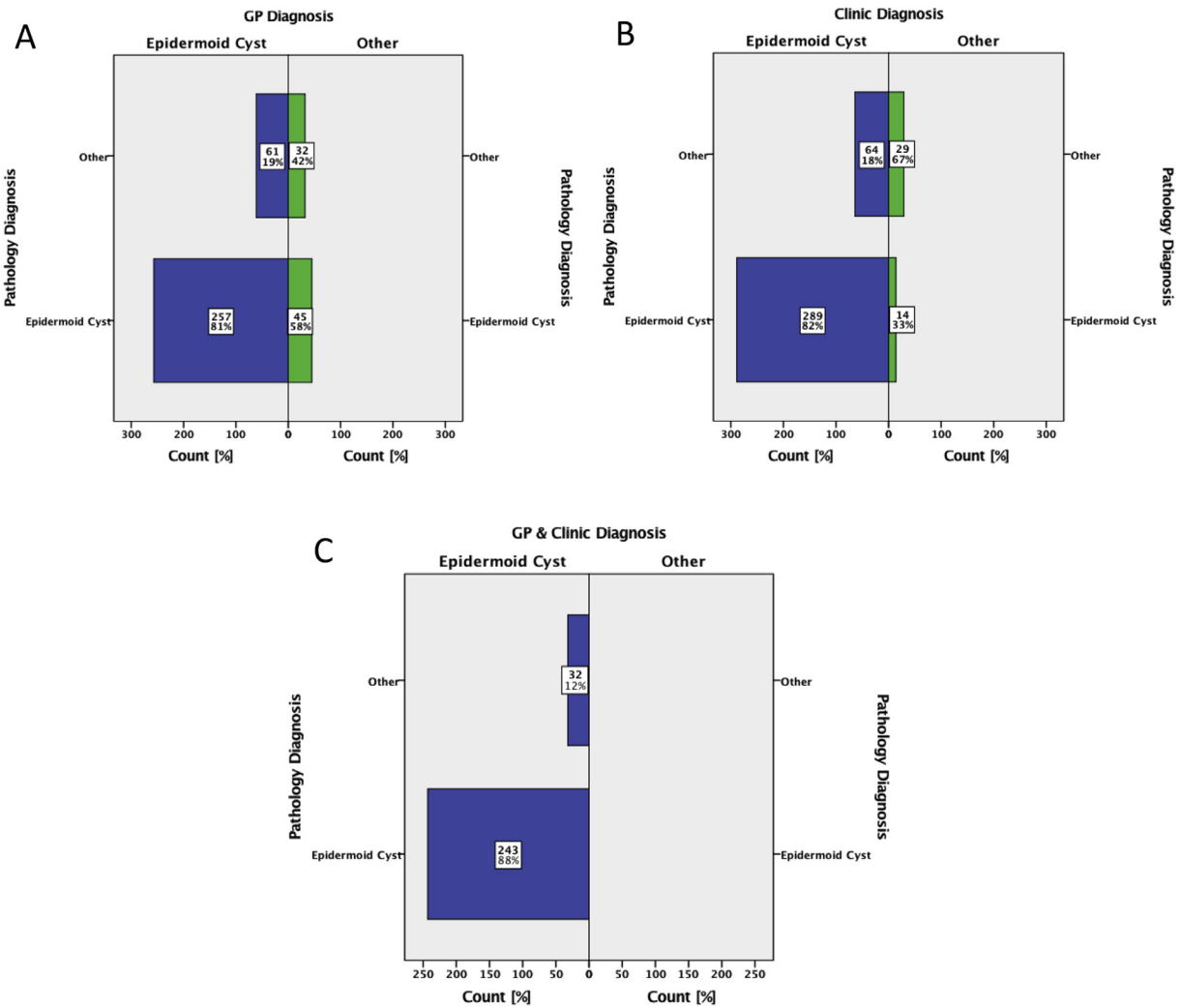
Epidermoid cysts are common benign cutaneous lesions, which often present as a small, hemispherical and mobile cystic lesion. They are commonly found on the scalp, face, and trunk but may also occur on the limbs and genitals. With most being asymptomatic, they may demonstrate size variability over time and in some cases present as infected cysts or abscesses. The presence of a punctum, ability to indent larger lesions and cheesy, tooth-paste like material on transection are pathognomonic clinical features. Atypical presentations of epidermoid cysts in adults or in any child may be associated with a rare condition called Gardner's syndrome, a variant of Familial Adenomatous Polyposis (FAP) which predisposes to intestinal polyps, fibromatosis, osteomas, and epidermoid cysts [6]. The vast majority, however, are benign and malignant association is a very rare occurrence [7–9]. A small number of isolated case reports have documented the development of squamous cell carcinoma arising from the walls of epidermoid cysts [7,8,10]. Reported incidence of such transformation remains extremely low in the order of 0.05% [7], a relatively insignificant proportion of all excised lesions. Morrissett et al. [11] describe some red flag features suggestive of malignant association including rapid growth, and

ulceration. Lesions found to have any such concerning features should be sent for histological examination. We would not dispute this but strongly encourage the histological examination of clinically suspicious or undiagnosed cutaneous lesions.

However, this study demonstrates the ability of experienced clinicians to accurately make a diagnosis of epidermoid cyst based on the history and clinical examination. In about 80% of cases, the lesion was correctly identified as an epidermoid cyst clinically and in the remaining 20%, these lesions were noted to be benign on histological examination with no change in management and no further surgical intervention or follow-up required. Clinically suspected epidermoid cysts are predominantly found to be benign lesions with the risk of erroneous diagnosis of a malignant lesion being negligible. This is supported by previously published studies [3,7].

In our study, over two-thirds of clinically apparent epidermoid cysts were sent for routine histological examination. Agreement between referring clinician and assessing surgeon was associated with an increased likelihood of an accurate diagnosis. The level of surgical experience did not predict request for histological examination as rates among consultants and non-consultants were similar. The “send-by-default” practice may be a throwback to historical surgical teaching where surgeons were encouraged to routinely send all excised specimens for histological examination, irrespective of clinical certainty regarding diagnosis for definitive documentation and thus avoid potential medico-legal action [3]. Though not explored in our study, a further factor might be the perceived lack of confidence in clinical judgment among surgeons in training, and thus histological examination serves as a safety net and confirmation of diagnosis. Furthermore, some pathologists and surgical colleagues would insist on the routine histological examination of all lesions or tissues excised from the human body as standard, a dogma we aim to challenge.

The routine examination of histological specimens is not without cost. Everywhere in the world healthcare resources are finite yet subjected to increasing demand, and it is sensible to use limited, and in some cases, diminishing resources, as wisely as possible. The health economic implications of “routine” histological



**Fig. 2.** (A–C): Accuracy of diagnosis. A) GP suspicion versus final histological diagnosis. B) Surgeon diagnosis in clinic versus confirmed histological diagnosis. This demonstrates similar accuracy to GPs in identifying epidermoid cysts but much higher accuracy at diagnosing non-epidermoid cyst benign skin lesions. C) Agreement between GP and clinic associated with improved accuracy of diagnosis.

examination of specimens have been explored in other specialties such as colorectal surgery [12], ENT [13], and hepatobiliary surgery [14], particularly where there are alternative approaches [12]. Recent work on routine pathology examination of diminutive polyps in the bowel screening programme as compared with in vivo assessment showed an up to 113-fold reduction in pathology costs with no adverse effect on diagnosis of polyp cancers [12]. Similarly, we question the practice of continued spending on routine histological examination in areas where an accurate benign diagnosis can be made clinically. This is particularly true with epidermoid cysts where a definite diagnosis, in the majority of cases, can be made based on pathognomonic features and malignant potential is negligible. The annual cost of routine histological examination of these lesions is significant, estimated at £1.9million across the UK. These figures do not take into consideration the administrative time and resources associated with the follow up of these results.

**5. Conclusion**

In summary we recommend that where there is a clinical suspicion of an epidermoid cyst, a careful preoperative clinical examination should be undertaken for the presence of a punctum and

indentation in larger lesions, which are pathognomonic features. Standard operative excision techniques should be employed to ensure the cyst wall is excised intact. The excised cyst should be examined carefully to identify any red flag features. We suggest that the specimen should then be transected peri-operatively to further support the diagnosis. If the contents are cheesy material consistent with an epidermoid cyst, then the diagnosis is confirmed and the specimen can be discarded. If there is diagnostic ambiguity, or the contents are solid, the specimen should be sent for histological examination. Surgeons in training should be taught to do this confidently early in their careers. Such an approach would free up valuable pathology time and create a potential saving of at least £1.9million every year to the UK NHS health care system.

**Ethical approval**

Not applicable.

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None.

**Author contribution**

Jeyakumar R. Apollos – Concept, design, data collection, analysis, manuscript preparation and editing.

Gregory E. Ekatah – Concept, design, data collection, analysis, manuscript preparation and editing.

Guat Shi Ng – Data collection.

Angus K. McFadyen – Statistical analysis, and manuscript review.

Stuart C. Whitelaw – Study concept, manuscript review.

**Conflict of interest**

None to declare.

**Consent**

Not applicable.

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