



## The Number of Passes Made in Fine Needle Aspiration of Salivary Glands Does not Influence Diagnostic Yield

John P.J. Rocke

Aberdeen Royal Infirmary, Scotland.

### Introduction

First described by Kun in 1847 Fine Needle Aspiration (FNA) has since become a widely used technique used across numerous medical and surgical specialities [1]. Its growth as a diagnostic tool was expedited by a Head and Neck specialist team in New York in the 1930s whose pathologist, Fred Stewart, interpreted the smears [1]. One of Dr Stewart's key points for successful FNA was "emphasis on the technique of aspiration and preparation of the sample" [1]. Despite this there have been no studies since then that have investigated the optimal number of passes required to obtain a sufficient yield for a cytological diagnosis in the Head and Neck [1].

The technique involves passing a fine bore needle through a presenting lesion to obtain cytological material that can be analysed, often immediately, under a microscope to achieve a diagnosis or at likely grade of disease. Its specificity and sensitivity, when employed in the head and neck, has been widely studied and both are above 85% [2-4]. These statistics combined with its low cost and low associated morbidity has meant that it has long been at the forefront of the investigation of patients with potential Head and Neck malignancy [5].

Despite FNA's widespread use in hospitals and clinics worldwide there have been few studies investigating how many passes of the needle the operating clinician should use. The few published studies use upper gastrointestinal organs as their target and are therefore not necessarily applicable to practice in Head and Neck Oncology [6-7]. A recent study found the diagnostic yield did not increase after 4 passes when the pancreas was the target organ [8]. There are no similar published studies in the Otolaryngological field however.

Redman et al. found that in FNA of the thyroid gland ultrasound assistance in addition to onsite assessment of the cytology resulted in a decreased number of passes. They did not however specifically assess if their cytological results improved with an increased number of passes alone [9].

It would be easy to hypothesise that increasing the number of passes through the lump would increase the diagnostic yield. However increasing the number of the passes through the skin in to the lesion will in turn mean an increase in patients discomfort and procedural time.

We set out to determine the number of passes required to reduce indeterminate FNA specimens in Salivary Gland FNA. Ultimately if the number of passes employed in the technique could be specified this could potentially reduce procedural time and improve clarity amongst clinicians and technicians who perform this technique on Head and Neck patients.

### Methods

This study was undertaken at Aberdeen Royal Infirmary in Scotland. This hospital is a tertiary teaching hospital serving a population in the region of six-hundred-thousand people. We chose a six year period between 2007 and 2012 inclusive to conduct this retrospective investigation. Data was extracted from the hospital's electronic cytopathology reporting system by a technician using the following codes:

1. Neck FNA
2. Head FNA
3. Parotid Gland FNA
4. Salivary Gland FNA

2479 FNAC reports were found using this system. Each of these individual reports were analysed for accuracy. Due to the broad nature of these categorisation codes a large number of the FNAC samples in this list were not targeted at salivary gland lesions.

As such 1879 FNAC samples were excluded leaving 600 FNAC investigations specifically investigating salivary glands. Of these 600 specimens there was no documentation in the reporting system regarding the number of passes for 288 procedures leaving 312 for subsequent analysis.

A staging system was applied to these remaining results to grade the diagnosed cytology with a category allocated for "non-diagnostic/insufficient sample" (Box 1).

<p>Box 1  C1 = Insufficient or Inadequate  C2 = Benign/Inflammatory  C3 = Atypical, probably benign  C4 = Suspicious  C5 = Malignant</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------

We assessed if the number of C1 (insufficient or inadequate) samples changed with increasing number of passes taken during FNA. The other four grades were samples where the pathologist deemed the sample to be sufficient for analysis and were able to describe the likely pathology or at least differentiate between the broad categories above.

\*Address for Correspondence: Red Cross Children's Hospital, The University of Cape Town, South Africa. E-Mail: johnpirocke@gmail.com

Received: November 23rd, 2017; Accepted: January 3rd, 2018; Published: January 5th, 2018.

The data was analysed using Microsoft Excel and a free online statistical tool to assess whether there was a difference between the number of passes made and the proportion of diagnostic to non-diagnostic samples.

## Results

The minimum number of passes performed by the operator was 1 and the maximum was 3. No details were included as to the background of the operator or their individual experience in the cytology reports and as such a subgroup analysis could not be included.

Table one demonstrates the number of passes undertaken and the distribution across each group. The majority of technicians chose to employ either one or two passes with three passes being undertaken in just 5% of patients.

**Table 1:** Comparing the Diagnostic vs Non-Diagnostic Rates for Each Number of Passes Used.

Number of Passes	Non Diagnostic	Diagnostic
1	35 (24%)	112 (76%)
2	30 (21%)	115 (79%)
3	5 (31%)	11 (69%)

The proportion of C1 (non-diagnostic/insufficient) FNA samples did not vary statistically significantly between 1, 2 or 3 FNA passes (ANOVA,  $p > 0.05$ ).

## Discussion

Until now there have been no studies specifically examining if increasing the number of passes increases diagnostic yield of the FNA technique within the speciality of Otolaryngology. This study, specifically looking at salivary gland targets, found that no more than one pass through the target lesion is required. This finding should offer guidance to clinicians undertaking these FNAs that only one pass is required to achieve a similar diagnostic accuracy to two, or three, passes.

Only salivary gland aspirates were studied and as such it may not be able to transfer these findings to other anatomical sub-sites of the Head and Neck without undertaking similar investigations. That said, the nature of Head and Neck FNA means that lesions are often easier to access than those, for example, in the upper gastrointestinal tract where it has been found that more passes are required to gain an optimum sample. As such it could be hypothesised that one pass is likely to be sufficient in other sites of the head and neck particularly when adjuncts such as Ultrasound are employed.

Unfortunately the reason for choosing to undertake a second or third pass on an individualised patient basis was not included in the technicians request on our online system. It could be that the first pass did not objectively obtain enough cellular material when expelled on to the microscope slide which could have reduced insufficient or inadequate (C1) specimens. However it is not known if this subjective assessment by the operator is accurate and this would be interesting to study prospectively in the future.

This finding will guide, and improve confidence of, clinicians undertaking this procedure and should reduce unnecessary patient discomfort in addition to saving time in clinics and reducing morbidity.

## Conclusion

It is hoped that this study will help to guide clinicians when performing FNA in the Head and Neck. It seems that performing just one pass is enough to produce enough yield for a histological diagnosis. If one pass is the default for these investigations it will reduce patient discomfort and morbidity from further passes as well as serving to reduce procedural time.

## Compliance with Ethical Standards

The author declares no conflicts of interest relating to this research and has received no grants or other awards to conduct it. This article does not contain any studies with human participants or animals performed by the author.

## References

1. Ansari NA and Derias NW. Fine needle aspiration cytology. *J Clin Pathol*.1997; 50:541-543. [[Crossref](#)]
2. Tatomirovic Z, Skuletic V, Bokun R, Trimcev J, Radic O, Cerovic S, et al. Fine needle aspiration cytology in the diagnosis of head and neck masses: accuracy and diagnostic problems. *J BUON*. 2009; 14:653-659. [[Crossref](#)]
3. Liu CC, Jethwa AR, Khariwala SS, Johnson J and Shin JJ. Sensitivity, Specificity, and Posttest Probability of Parotid Fine-Needle Aspiration: A Systematic Review and Meta-analysis. *Otolaryngol Head Neck Surg*. 2016; 154:9-23. [[Crossref](#)]
4. D'Anza B, Kraseman SJ, Canto-Helwig C, Greene JS and Wood WE. FNA biopsy of pediatric cervicofacial masses and validation of clinical characteristics of malignancy. *Int J Pediatr Otorhino laryngol*.2015; 79:1196-1200. [[Crossref](#)]
5. Borget I, Vielh P, Leboulleux S, Allyn M, Iacobelli S, Schlumberger M, et al. Assessment of the cost of fine-needle aspiration cytology as a diagnostic tool in patients with thyroid nodules. *Am J Clin Pathol*. 2008; 129:763-771. [[Crossref](#)]
6. Erickson RA, Sayage-Rabie L and Beissner RS. Factors predicting the number of EUS-guided fine-needle passes for diagnosis of pancreatic malignancies. *Gastro intest Endosc*. 2000; 51:184-190. [[Crossref](#)]
7. Turner BG, Cizginer S, Agarwal D, Yang J, Pitman MB, Brugge WR, et al. Diagnosis of pancreatic neoplasia with EUS and FNA: a report of accuracy. *Gastrointest Endosc*. 2010; 71:91-98. [[Crossref](#)]
8. Mohamadnejad M, Mullady D, Early DS, Collins B, Marshall C, Sams S, et al. Increasing Number of Passes Beyond 4 Does Not Increase Sensitivity of Detection of Pancreatic Malignancy by Endoscopic Ultrasound-Guided Fine-Needle Aspiration. *Clin Gastroenterol Hepatol*. 2017; 15:1071-1078.e2. [[Crossref](#)]
9. Redman R, Zalaznick H, Mazzaferri EL and Massoll NA. The impact of assessing specimen adequacy and number of needle passes for fine-needle aspiration biopsy of thyroid nodules. *Thyroid*. 2006; 16:55-60. [[Crossref](#)]