

## **Audit of adequacy of rectal suction biopsies using a new rectal biopsy gun.**

### **Authors**

Skerritt C\*, Rees C\*, Lakhoo K\*\*

\*Specialist registrars, Department of Paediatric Surgery, Oxford Children's Hospital, Headington, Oxford OX3 9DU.

### **Corresponding Author**

Clare Skerritt

Oxford Children's Hospital, Headington, Oxford OX3 9DU

clareskerritt@nhs.net

### **Lead Consultant**

\*\*Kokila Lakhoo, Department of Paediatric Surgery, Oxford Children's Hospital, Headington, Oxford OX3 9DU.

The Online Journal of Clinical Audits. 2011; Vol 3(2).

Published May 2011.

To subscribe to The Online Journal of Clinical Audits go to:

<http://www.clinicalaudits.com/index.php/ojca/user/register>

Article submission and authors instructions:

<http://www.clinicalaudits.com/index.php/ojca/about/submissions>

---

**Abstract**

**Aims** – The aim of this audit was to establish whether the introduction of a new rectal suction biopsy gun had resulted in a reduction in the percentage of inadequate rectal biopsies. A cost saving analysis was also performed to check that potential savings had been realised.

**Methods** – This was a retrospective audit of all suction rectal biopsies performed after the introduction of a new rectal suction biopsy gun (rbi2) from 1<sup>st</sup> August, 2009 to 31<sup>st</sup> July, 2010. The pathology department database was used to ensure that all biopsies were included (n=40). Information on the age of the patients, underlying diagnosis, number of biopsies taken and results of the biopsies were collected. An analysis of costs was performed to see if the expected savings had been achieved since the introduction of the new biopsy gun.

**Results** – There was a reduction in the percentage of inadequate rectal biopsies from 30% to 5%. The cost saving analysis demonstrated that savings of at least £10,000/- per annum had been achieved since the introduction of the new suction rectal biopsy gun.

**Conclusions** – The Oxford Children's Hospital Paediatric Surgery Department is now achieving the same rate of adequate biopsies as reported in the literature. This has meant that now no child has undergone an unnecessary general anaesthetic and the departmental costs have been demonstrably reduced.

---

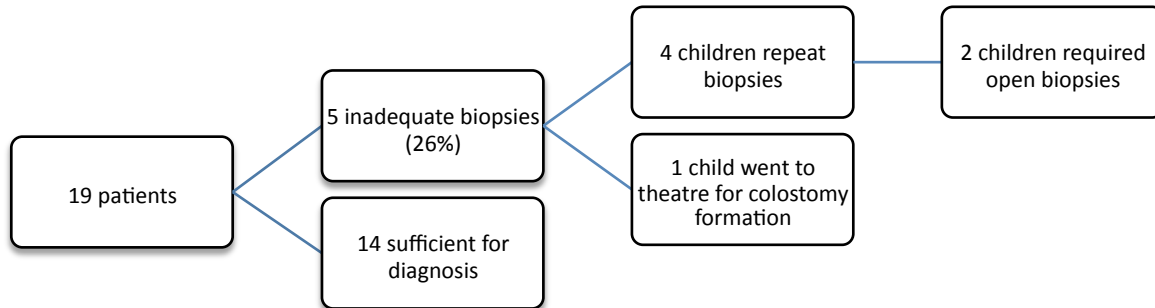
## **Audit of adequacy of rectal suction biopsies using a new rectal biopsy gun.**

**Introduction**

Rectal biopsies are performed in children to investigate whether a child has Hirschsprung's disease. The biopsy specimen must contain a sufficient amount of submucosa in order to make the diagnosis. In children under 6 months of age it is possible to perform rectal suction biopsies on the ward without any sedation.<sup>1</sup> In older children it is necessary to perform open biopsies in theatre with a general anaesthetic in order to get adequate tissue samples. A recent publication reports that rectal suction biopsies should obtain sufficient tissue to achieve a diagnosis in 93% of patients.<sup>2</sup>

It was noticed by the staff working in the Paediatric Surgery Department at Oxford Children's Hospital, that a substantial number of rectal suction biopsies were being reported as inadequate for diagnosis. When this was audited from January 1<sup>st</sup> to July 31<sup>st</sup> 2009 it was found that 26% of suction rectal biopsies were inadequate for diagnosis.

Figure 1 : Flowchart of audit from 1<sup>st</sup> January, 2009 to 31<sup>st</sup> July, 2009.



This meant that children were undergoing repeat biopsies and in several cases patients' discharges were delayed until diagnosis of Hirschsprung's disease was made. These biopsies had been performed using Noblett non-disposable rectal suction biopsy forceps.<sup>3</sup> Although these were sent away for sharpening no improvement was noted. Therefore a business case was made to purchase the new rbi2 rectal suction biopsy gun to see if this resulted in a reduction of inadequate biopsy specimens.

## Aim

The aim of the audit was to determine whether the department was now achieving the published 93% rate of adequate rectal biopsies, using the new rbi2 rectal suction biopsy gun, and whether this had resulted in the predicted reduction in costs for the department.

## Audit Standard

The rbi2 rectal suction biopsy gun should obtain sufficient tissue for diagnosis in 93% of patients.<sup>2</sup>

## Methods

This was a retrospective audit of all rectal suction biopsies, performed after the introduction of the rbi2 rectal suction biopsy gun from 1<sup>st</sup> August, 2009 to 31<sup>st</sup> July, 2010. The pathology department database was used to ensure that all biopsies were included. Information on the age of the patients, underlying diagnosis, number of biopsies taken and results of the biopsies was collected. Case notes were then reviewed to see whether patient discharges were delayed due to inadequate biopsy results.

In our department it is customary to take at least 2 biopsy specimens each time a patient undergoes a rectal suction biopsy. When analysing the results there were a group of patients whose biopsies, although sufficient for diagnosis, contained specimens with a poor amount of submucosa for examination. These biopsies required extra laboratory processing. The number of serial sections was increased from 10 to 60 in order to try and identify ganglion cells. These biopsies were defined as poor but still sufficient for diagnosis. A cost saving analysis was then performed to see if the expected savings had been achieved since the introduction of the new suction rectal biopsy gun.

Data were analysed using Stata version 7. Fisher's exact test and Mann-Whitney U test were performed as appropriate.

## Results

38 children were investigated for Hirschsprung's disease over the 12-month period. 36 of the 38 (95%) initial biopsies were adequate for diagnosis. 2 children underwent a second rectal suction biopsy. These were both adequate. Therefore no child needed to undergo a general anaesthetic in order to diagnose Hirschsprung's disease. The 2 children who had an inadequate initial biopsy had colonic atresia, and the biopsies were performed with a colostomy-in-situ. It is recognised that unused bowel distal to a colostomy undergoes lymphatic hypertrophy and it may be that this contributed to the difficulty in obtaining an adequate tissue sample.

There were a number of biopsies that were poor quality (24%) i.e. a small amount of tissue increasing the number of sections that needed to be examined histologically. Despite these shortcomings, it was possible to obtain a diagnosis for all these children.

Figure 2 : Suction Biopsy Results (1<sup>st</sup> August, 2009 – 31<sup>st</sup> July, 2010)

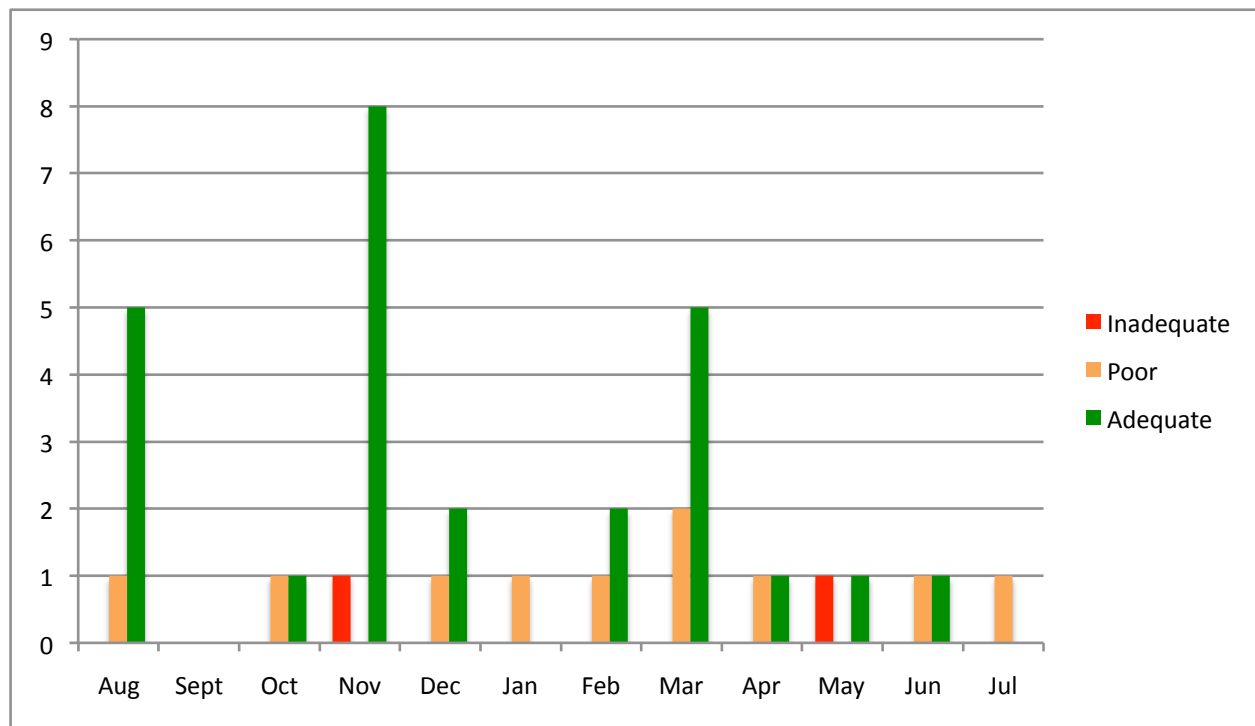


Figure 3: Comparison between the old and new rectal biopsy gun.

Method of sampling	Adequate	Poor (still possible to make diagnosis)	Inadequate	Total number of biopsy episodes	Hirschsprung's Disease
Noblett (old)	9 (40%)	7 (30%)	7(30%)*	23	3 out of 19 (16%)
rbi2 (new)	28 (70%)	10 (25%)	2(5%)*	40	5 out of 38 (13%)

\*Fisher's exact test for difference between proportion of inadequate biopsies was significant  
p= 0.009

Median ages of patients

Noblett 18 days (range 2-210 days)

rbi2 41 days (range 2-188 days)

p= 0.1

Figure 4 : Cost Saving Analysis

<u>Costs</u>	<u>Noblett</u>	<u>rbi2</u>	<u>YEARLY SAVING</u>
Laboratory	Standard = £800 Extra processing =£6000 TOTAL £6800	Standard = £1400 Extra processing = £3000 TOTAL £4400	£2400
Theatre	2 children over 7 months = £500	No child	At least £500
Extra days in hospital	20 days £6000 over 7 months, possibly up to £10,000/yr	2 extra days £600	Possibly £9400
Running costs	Nil	£50/ biopsy £2000	- £2000
TOTAL			£10, 300

The laboratory costs for the old Noblett rectal biopsy forceps, were calculated from the monthly costs over the 7 months audited, and then extrapolated for a year. There was no available data for the cost of an overnight stay in hospital or the cost of theatre time. These were estimated as follows:

Overnight stay in hospital	£300/-
Theatre time for open rectal biopsy	£250/-

## Discussion

The problem of obtaining good samples seemed to be due to blunt blades in the non-disposable rectal biopsy forceps (Noblett) that the department used. The instruments were sharpened but no difference was noted. Therefore a business case was made to purchase a new rbi2 biopsy gun with disposable blades. The department with a published 93% success rate had used the rbi2 gun. The running costs for this rectal biopsy gun are £50 for each biopsy episode (it is customary in our department to take at least 2 specimens each time a patient undergoes a suction rectal biopsy).

There has been a significant improvement in the success of rectal suction biopsies from 70% to 95%. Our results are now in line with the published literature. No child has needed to undergo an unnecessary anaesthetic since the introduction of the new biopsy gun. The results of the audit were relayed to the pathology consultants. They have noticed that the quality of the specimens that they are receiving has improved, and this has helped to reduce the workload. Although 25% biopsies still require extra laboratory work to obtain a diagnosis, the pathology department feels that this is acceptable.

The results were presented at the Paediatric Surgery departmental audit meeting in November, 2010. The department feels that the introduction of the new biopsy gun has led to an improvement in patient care.

## Conclusion

The Oxford Children's Hospital Paediatric Surgery Department is now achieving the same rate of adequate biopsies as reported in the literature. Therefore, no child has undergone an unnecessary general anaesthetic, and the departmental costs have been demonstrably reduced.

## Recommendations

We aim to reduce the number of specimens that are poor quality, needing extra laboratory work, by changing the syringe used to generate suction, and by trialling a new pressure monitor.

## References

1. Alizai NK, Batcup G, Dixon MF, Stringer MD (1998) Rectal biopsy for Hirschsprung's disease: what is the optimum method? *Pediatric Surgery International* **13**, 121-4.
2. Hall N, Kufeji D, Keshtgar A (2009) Out with the old and in with the new: a comparison of rectal suction biopsies with traditional and modern biopsy forceps. *Journal of Pediatric Surgery* **44** (2), 395-39.
3. Noblett HR (1969) A rectal suction biopsy tube for use in the diagnosis of Hirschsprung's disease. *Journal of Pediatric Surgery* **4** (4), 406-9.