

# Predictability of 48-h Delayed Retention of Contrast in Barium Enema in Cases of Chronic Constipation

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## Abstract

**Introduction:** Diagnosis of Hirschsprung's disease depends on rectal biopsy. This study was designed to find an alternate diagnostic modality to exclude Hirschsprung's disease. **Aim:** The aim of this study was to find the predictive value of delayed retention of contrast in excluding Hirschsprung's disease. **Materials and Methods:** All cases of chronic constipation presenting during the study duration from June 2014 to June 2016 were included. Those without any obvious history of conservative management were excluded. Parameters considered in barium enema were initial film, routine films, and delayed retention of contrast at 24, 48, and 72 h. They were then subjected to rectal biopsy. The results of rectal biopsy and barium enema were analyzed. **Results:** One hundred and thirty-eight patients presented during the study duration. One hundred and twenty-eight formed the study group. The average age of presentation was 48 months (range, 1–144). The average duration of prior medical management was 8 months (range, 6–48 months). Forty-two cases were diagnosed as Hirschsprung's disease on rectal biopsy. The symptoms resolved in 31 cases after rectal biopsy and 42 cases after definitive surgery. In the remaining 55 cases, dietary modification along with laxatives was instituted, and they were kept under follow-up. The average follow-up was 12 months (range, 6–48 months). Of the various parameters in barium enema, delayed retention of contrast at 48 h had the highest negative predictive value of 99.67%. **Conclusion:** Delayed retention of contrast at 48 h has the highest negative predictive value in excluding Hirschsprung's disease. This can safely be used to exclude Hirschsprung's disease in cases of chronic constipation.

**Keywords:** Barium enema, constipation, delayed retention of contrast, Hirschsprung's disease, rectal biopsy

## INTRODUCTION

Hirschsprung's disease is one of the common causes of constipation requiring surgical management. The diagnosis of Hirschsprung's disease essentially depends on the rectal biopsy. Rectal biopsy is considered as the gold standard in the diagnosis of Hirschsprung's disease.<sup>[1-3]</sup> These patients primarily present to the primary health-care provider or continue consuming many recommended or nonrecommended over-the-counter medications. The definitive diagnosis in most of these cases thus is delayed due to their resistance toward referral for rectal biopsy. Barium enema is an important diagnostic modality pointing toward the diagnosis of Hirschsprung's disease.<sup>[1-3]</sup> The ability of barium enema in reaching a diagnosis is essentially dependent on the expertise and experience of the performing radiologist

because overfilled films or high-pressure enema leads to high false-negative rates. Logically thinking upon the pathology, the excretion or evacuation of the contrast after barium enema is a passive phenomenon and should be independent of the pressure and technique used in performing the barium enema. For a person having the possibility of Hirschsprung's disease, there should be delayed retention of the contrast. More the delay in retention more the probability. It was thus this study was planned to see the predictive value of delayed retention. The purpose of this study was to find an alternate diagnostic

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Received: 13-04-2017 Revised: 26-02-2018 Accepted: 17-05-2019 Available Online: 21-10-2020

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**DOI:**  
10.4103/ajps.AJPS\_35\_17

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**How to cite this article:** Sharma N, Sharma M, Singh BP, Chandrakar K, Chandrakar RK, Verma SR. Predictability of 48-h delayed retention of contrast in barium enema in cases of chronic constipation. Afr J Paediatr Surg 2020;17:15-7.

parameter in excluding Hirschsprung’s disease. When the natural history of the disease is considered delayed, retention of contrast seems to be more logical factor in excluding or making a diagnosis, and it should be independent of the type of technique used for performing barium enema. In other words, delayed retention of contrast should be more predictive even in poorly performed barium enemas avoiding repetition and radiation exposure. Thus, delayed films were taken at 24.48 and 72 h [Figure 1].

**Aim**

The aim of this study was to find the predictive value of delayed retention of contrast in cases of chronic constipation in excluding Hirschsprung’s disease.

**MATERIALS AND METHODS**

All the cases of chronic constipation below 14 years of age presenting during the study duration from June 2014 to June 2016 were included. The detailed history with the history of medications was evaluated. Those with a history of previous medical management <6 months, those with anorectal malformations, those with a history of any surgery in the anorectal region, those who refused consent for barium or rectal biopsy, or those with a history of any lumbosacral spine deformity were excluded. The study participants were subjected to barium enema keeping in view these parameters: initial film, barium enema films, delayed retention of contrast in 24 h, delayed retention of contrast in 48 h [Figure 1], and delayed retention of contrast at 72 h and beyond. The parameters considered were transition zone (evaluated primarily in the initial images and the follow-up enema films if present) and delayed contrast retention in the delayed films. As the quality of initial barium enema films and the routine barium enema films could not be standardized due to logistics (changing shift of the radiographers and multiple radiologists) and unclear role of the delayed films in literature, all the patients were then subjected to full-thickness rectal biopsy irrespective of the barium enema findings under general anesthesia (as the reporting pathologist was not sure about reporting on suction rectal biopsy or punch biopsy specimen). The diagnosis of Hirschsprung’s disease was made on the basis of rectal biopsy. The positive or negative predictive value of the barium enema parameters was analyzed.

**RESULTS**

One hundred and thirty-eight patients with chronic constipation presented during the study duration. One hundred and twenty-eight formed the study group. There were 48 females and 80 males. The average age of presentation was 48 months (range, 1–144 months). The average duration of prior medical management was 8 months (range, 6–48 months). Forty-two cases were diagnosed as Hirschsprung’s disease on rectal biopsy. These cases were subjected to definitive repair. The symptoms resolved after rectal biopsy in 31 cases and 42 cases after definitive surgery for Hirschsprung’s disease.

In the remaining 55 cases, dietary modification along with laxatives was instituted, and they were kept under follow-up. In 49 cases, constipation resolved on medical management while it persisted in 6 cases in the last follow-up. The false-positive and false-negative rates of the four parameters are shown in Tables 1-4. The negative predictive value of 24-h delayed retention of contrast was 5%. The negative

**Table 1: Predictive values for initial films**

	HD present	HD absent
Transition zone present	3 (a=true positive)	2 (b=false positive)
Transition zone absent	39 (c=false negative)	84 (d=true negative)
Negative predictive value for HD=d/(c+d)=68.3%, Positive predictive value=a/(a+b)=60%. HD: Hirschsprung’s disease		

**Table 2: Predictive values for routine barium enema films**

	HD present	HD absent
Transition zone present	3 (a=true positive)	2 (b=false positive)
Transition zone absent	39 (c=false negative)	84 (d=true negative)
Negative predictive value for HD=d/(c+d)=68.3%, Positive predictive value=a/(a+b)=60%. HD: Hirschsprung’s disease		

**Table 3: Predictive values for delayed retention of contrast at 24 h**

	HD present	HD absent
Retention present	36 b (a=true positive)	82 (b=false positive)
Retention absent	69 (c=false negative)	4 (d=true negative)
Negative predictive value for HD=d/(c+d) = 5%, Positive predictive value=a/(a+b)=31%. HD: Hirschsprung’s disease		

**Table 4: Predictive values for delayed retention of contrast at 48 h**

	HD present	HD absent
Retention present	41 (a=true positive)	1 (b=false positive)
Retention absent	02 (c=false negative)	84 (d=true negative)
Negative predictive value for HD=d/(c+d)=97.67%, Positive predictive value=a/(a+b)=97.6%. HD: Hirschsprung’s disease		



**Figure 1:** Plain X Ray abdomen at 1(a) 24 hours after Barium enema and 1(b) 48 hours after Barium enema

predictive value for delayed retention of contrast at 48 h and 72 h was 97.67% [Table 4]. The average follow-up was 12 months (range, 6–48 months).

## DISCUSSION

Hirschsprung's disease is a type of congenital anomaly which is characterized by the absence of ganglion cells in the myenteric plexus. The sequelae of this lead to presentation as chronic constipation of varied duration depending on the educational level of the parents and the severity or length of the aganglionic segment. As per the available literature, aganglionic segment most commonly lies at the rectosigmoid junction (classical Hirschsprung's disease), and this is about 90%.<sup>[4]</sup> Apart from classical variant, the aganglionic segment can be ultra-short or long segment ranging from the rectum to any part of the colon; if the whole of the colon is aganglionic, it is called total colonic aganglionosis. There are a lot of dilemmas in the diagnosis, and most of the times, the delay in the presentation is due to the delay in the presentation to the surgeon either from the patient or from the primary caretaking pediatrician.

The diagnosis of Hirschsprung's disease consists of barium enema, anorectal manometry, and confirmation by rectal biopsy. Anorectal manometry depends on the absence of the rectosphincteric reflex in patients of Hirschsprung's disease. This is calculated using pressure calibrated manometry probe which is placed such that one of the sensors is at the rectum, another at the internal sphincter, and last at the external sphincter. Anorectal manometry is currently less popular due to the lack of availability of the facility in most of the centers and lack of availability of technical expertise in performing the procedure.<sup>[5]</sup> Besides, the result varies due to the associated confounding factor of appropriate sedation.

Barium enema is currently thus the most commonly used initial screening test. In barium enema, a lateral film is taken initially with small volume of contrast in a low-pressure fill; in this initial film, the small amount of contrast instilled goes into the dilated normal segment though the aganglionic narrow segment giving the appearance of the transition zone. The pressure and the volume used in barium enema is very much dependent on the operator doing the study. Due to this operator dependent

result the sensitivity (65%–80%) and specificity (66%–100%) of this test is highly variable and this make it a non reliable test.<sup>[2,3]</sup> Due to the pathology of the disease, contrast should be retained in the plain films irrespective of the technique of barium enema used. Thus, we did plain X-ray of the abdomen after the routine barium enema at 24.48 and 72 h; this was meant to document the presence or absence of retention of contrast and find the predictive value of the parameters. We found that delayed retention of contrast at 48 h had the positive predictive value of 97.6% and a negative predictive value of 97.67% which was similar to the values at 72 h, thus making the delayed retention of contrast at 48 h an important parameter in excluding and confirming the diagnosis [Table 4]. We can thus propose that the diagnosis or exclusion of Hirschsprung's disease can comfortably be done using the delayed contrast retention at 48 h as an important parameter.

## CONCLUSION

Delayed retention of contrast at 48 h has the highest negative predictive value in excluding Hirschsprung's disease. This can safely be used to exclude Hirschsprung's disease in cases of chronic constipation.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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