DISCUSSION
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The roentgenologic visualization of small intestine is limited to great extent by the anatomical and physiological features of the same. Length of the small bowel and superimposition of intestinal loops are the main limiting factors. Conventional barium meal follow-through examination is still considered to be the routine radiological investigatory method for the small bowel, despite of its several known limitations, rendering a lesion of bowel undetectable. As the examination only allows to take interval films, it is possible, particularly with slow transit, for lesions not to be adequately included in the specified loops. Moreover it is a well established fact that segment containing the lesion may be specified and shown on the film yet can not be recognised. Further more the intestinal motor functions would and reshape the
optimum medium to such a wide range of appearances, that at times it becomes difficult to differentiate between functional and organic changes of small bowel. This is caused due to lack of full distension of bowel achieved by the conventional method, irrespective to the quantity of barium suspension used. Intact pyloric activity is also one of the limiting factors, governing the gastric emptying, thus preventing the full distension of small bowel.

The flocculation of barium may also occur, aggravating the problem. Flocculation of barium suspension is a physio-chemical process that increases with transit time. Clumping of the barium is further enhanced by the physiological withdrawal of water from barium suspension in the distal part of ileum, unfavourable conditions such as inflammatory diseases of small bowel and mal-absorption syndromes occurring about this change rapidly.

Once the segmentation and flocculation of barium start, true anatomical representation of the lumen of small bowel is not obtained. The stasis of barium at certain points during its course occurs to
good many occasions. This allows large amount of barium to accumulate in few loops in the pelvis giving picture of barium pool. It is difficult, if not impossible to diagnose the disease confidently in barium pool. Therefore, it becomes essential to increase the rate of transit down the lumen, so that caecum is reached as quickly as possible. Roentgenograms should be taken only when the barium is still in suspending form.

Taking all these considerations into mind, it is suggested that the contrast medium should not be swallowed but should be directly introduced into the duodenum, bypassing stomach and duodenum. It is obvious that continuous introduction of large amount of contrast medium into small intestine is obtained through duodenal intubation eliminating the pyloric control.

Since 1929 when this idea was first mooted and brought into practice by Pesquera, the method has been receiving waxing and waning enthusiasm from the different workers. Chastki (1943) named this method 'small bowel barium enema.'
Friedman (1950), Lura (1951), Scott Harden (1960), Trickey (1963), Pygot (1965), Bilbao (1967) etc. carried out the radiological investigations by using this method and described their experiences as detailed already in review of literature.

All these workers were handicapped due to improper duodenal intubation which was not obtained in all cases and required great deal of time. The introduction of 'Bilbao double tube' brought about a significant improvement in intubation technique. Sellick (1970) carried out extensive trials of this method using this technique. He established the superiority and usefulness of this technique over conventional method in diagnosing the lesions of small bowel. At present the technique is in frequent use in various departments of radiodiagnosis.

In the present study 45 cases of suspected small bowel tuberculosis were studied. The cases subjected to double contrast examination, were either referred directly from clinicians suffering from small bowel tuberculosis or to clarify the inconclusive findings of conventional barium meal examination. The results of study obtained, have already been described in section of observations.
The preparation of patient was more or less same as for conventional barium meal examination. The duodenal intubation was done with simple radio opaque Ryle’s tube 110 cm. long with guide wire. The nasopharyngeal route was selected for the intubation. The tube was passed through one of the nasal antrum after lubricating with xylocaine jelly. It was passed upto pyloric antrum under fluoroscopic control. At this step 2 mg. metoclopramide was given intravenously to allow the pyloric sphincter to relax. Then it was gently pushed into duodenum. A good duodenal intubation was obtained in 20 cases (70%). The maximum time required for completion of duodenal intubation was only 15 minutes. Though most of the cases were intubated within half of this time (7-8 minutes). This was found to be in close approximation to the time taken by Fellink (1970) and Sanders (1976) for the duodenal intubation. They found that with practice it required less than 5 minutes to intubate a patient with minimum fluoroscopic time in 13.2% cases the duodenal intubation was not successful. It compares favourably with Nyes et al. (1976) who reported 1% of such incidence.
Glycerol bar was used as the non-flocculating
barium suspension in ratio of three parts of barium
suspended into 2 parts of water volume by volume. This
mixture was found to be of optimum consistency to be
injected down the tube through a 50 ml. glass syringe,
while retaining good mucosal adherence. 400-500 ml.
( mostly 600 ml. ) suspension was injected. Scott Harden
(1960) and Trickey (1963) used much less quantity
( 150 ml. ) to prevent overlapping, but it was found
that this could visualise only proximal loops of
jejunum and more distally, the dilution of contrast made
the results poor. Contrary to this, Sellick (1970) used in some cases, as much as 1200 ml. of contrast
medium. But in our study 600 ml. of contrast medium was
found to be good enough to visualise mucosal details
clearly. The contrast medium was injected by 50 ml.
glass syringe. Yet et al. (1976) also used 50 ml.
glass syringe with three way canula for the same. The
rate of flow was kept about 100 ml. per minute.

The rate of progress of head of barium column
in small bowel was found to be very rapid. In 45.36%
cases the head of barium appeared at caecum within 15-20
minutes. In 36.24% cases this was found to be between
15-30 minutes mainly because of improper duodenal intubation causing gastric reflux of contrast or due to obstructive pathology. Sellack (1976) in his series of 1500 cases also reported it to be 15 minutes (37% cases). This rapid rate was considered to be major advantage of this technique. Firstly it cuts down sharply the total examination time and secondly the fast moving head of barium column allowed intermittent fluoroscopic examination. Thus every loop of bowel was visualised throughout its filling stage. It allowed to take spot films whenever any irregularity was detected from the normal pattern of bowel. Conventional barium meal follow through study lacks in this respect due to very slow transit.

As it was shown by review of literature that a double contrast examination was better to get detailed findings of small bowel, particularly the distal loops of small bowel. In double contrast study, the overlapping of distal loops of ileum did not produce hindrance in interpreting the findings rather facilitated the study by allowing easy separation of air filled bowel coils, with external compression and coils could be seen through the double contrast
effect was obtained by introducing air through a blood-pressure instrument bulb down the tube. Because of fixity and easy location of terminal ileum and ileocecal junction, air could be seen passing through it and double contrast view of this region was found to be more informative and much clear.

Yet et al. (1976) and Herlinger (1978) advised the use of double contrast small bowel enema technique in various pathological conditions of small bowel including the inflammatory diseases.

Keeping this in view, our study included cases of small bowel tuberculosis presenting with different abdominal complaints. The cases were divided into 4 groups depending upon their mode of presentation as shown in Table No.2. Out of 45 patients studied, 44.4% presented with clear symptoms of ileocecal tuberculosis, 26.6% with symptoms of intractable recurrent diarrhoea and constipation and 13.2% presented with symptoms of subacute intestinal obstruction. 9.9% cases presented with lump in abdomen. In 22.2% of cases the radiological diagnosis was confirmed to clinical diagnosis. Thus confirming the clinical diagnosis. While rest of the radiological examination
was found to be normal. Whenever possible the radiological diagnosis was confirmed by post-operative findings and histopathological reports. Yet et al. (1975) and Sanders (1976) also obtained similar results positive radiological findings in 32% cases and 37% of cases respectively in their series.

The detection of ileocaecal tuberculosis at an early stage, before any obstructive sign of disease develops, always imposes a challenge both to clinicians and to radiologist. Usually the findings of follow-through examination are too vague to arrive at any conclusion. Out of 45 cases examined, only in 6 cases (13.3%) the findings of follow-through study were conclusive and these cases were not further investigated by the double contrast barium enema. 11 cases, which came out to be positive with conventional barium meal study, when subjected to double contrast examination, found to be normal. No radiological abnormality was detected in them. Hence the diagnosis was disproved in these cases. This shows very high percentage of false positive cases (24.2%) in follow-through study. This fact was very significant keeping the prolong treatment of disease into
consideration.

Out of 33 cases were studied by double contrast examination, only 4 were found to be positive. The diagnosis was further confirmed by post operative findings and histopathological reports. It was evident from the study, that radiographic results obtained by double contrast examination, made it possible to assess a case radiologically normal rather than in follow-through study. This was evident from the fact that all of the cases were mostly referred to rather rule out any abnormality of small bowel, because clinical suspicion was more towards the ileocaecal tuberculosis. Only in 2 cases excessive matting of the coils of small bowel was found rendering the opaque medium to be pooled in the coils.

No serious side effects were noted in our study. The side effects were of minor nature whenever present and subsided within 2-3 hours without any residual effect in 8.2% of cases severe nausea due to tube was detected. 6.4% cases vomited out the tube with barium suspension. This happened in those cases were duodenal intubation was not optimum. Abdominal
pain was reported in 19.2% of cases but it subsided by itself during 2-3 hours. In 17.6% of cases transient diarrhoea was reported due to large amount of fluid injected. No case of subacute obstruction aggravated with the technique employed.

From our study it was clear that the double contrast small bowel barium enema possessed certain diagnostic advantages over the routine follow-through examination. It is mainly advantageous in examining the whole of small bowel thoroughly, thus minimising the chances to miss a lesion and lines of demarcation between normal and abnormal bowel are exaggerated because of the distension of bowel involved. In most of cases a double contrast mucosal pattern of small bowel is obtained and local conditions such as strictures, adhesion etc. are more clearly shown.

The main disadvantage of the technique is the need for duodenal intubation and gastric reflux. Though duodenal intubation no doubt is unpleasant but the drawback must be balanced against improved quality and shortened examination time.

The problem of gastric reflux can be easily removed by placing the tube at junction of
second and third part of duodenum. This can be achieved easily with little cooperation from patient.

Overlapping of small bowel loops causes some problems particularly when the loops are located deep into pelvis where external compression is not possible. But in this instance the conventional method does not offer any solution or improvement.

From our study it is clear, that small bowel double contrast barium enema is definitely superior, more informative, accurate to conventional barium meal follow-through examination, bringing about more appropriate diagnosis of disease thus eliminating the incidence of false negative and false positive cases to great extent. Though it is not a substitute to routine barium meal follow-through examination but supplement to it and should be used where routine study proves to be inconclusive against strong clinical presentation of disease.