

THE BARIUM MEAL EXAMINATION VERSUS ENDOSCOPY

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Abstract. The **objectives** of our study were to evaluate two diagnostic methods (with and without x-ray) and to investigate the efficacy of barium meal examination. **Material and methods.** We performed a clinical randomized study at 675 subjects (aged 4 month-18 years) from University Children Hospital Iași (the only pediatric endoscopies department from North-East of Romania) and Students Hospital Iași. The calculated indices of the diagnostic methods were the sensitivity, specificity, efficiency, predictive values (PV+ and PV-) and usefulness index (UI). **Results.** The radiological examination had a UI above 0.35 only for esophageal stricture but in this case the esophagogastroscopy is recommended as diagnostically and as therapeutic procedure for dilatation of esophageal stricture. The endoscopy had a UI above 0.35 for all diseases excepted gastroesophageal reflux (GER) and esophageal diverticula's. **Conclusions.** The barium meal examination was requested in inappropriate situations such as: dyspepsia (routinely), peptic ulcer (follow-up) and gastrointestinal bleeding. The barium meal examination was repeated in 65.8% of cases. It is imperative to disseminate the guidelines for doctors indicating clearly the clinical context when these two diagnostic methods are to be recommended.

Key words: clinical randomized study, barium meal, endoscopy, efficacy

Rezumat. Obiectivele acestui studiu au fost: evaluarea comparativă a 2 metode diagnostice care folosesc sau nu radiațiile ionizante și investigarea eficienței prânzului baritat. **Material și metodă.** Studiul clinic randomizat a fost efectuat pe 675 pacienți cu vârste cuprinse între 4 luni și 18 ani de la Spitalul Universitar „Sfânta Maria” Iași, singurul departament de endoscopie pediatrică din nord-estul României și Spitalul pentru Elevi și Studenți Iași. Indicatorii calculați au fost sensibilitatea, specificitatea, eficacitatea, valorile predictive (pozitive și negative) și indicele de utilizare (IU). **Rezultate.** Indicele de utilizare a prânzului baritat a fost mai mic de 0,35 pentru toate bolile exceptând strictura esofageană. La bolnavii cu această afecțiune se recomandă endoscopia atât ca test diagnostic cât și terapeutic. Endoscopia a avut un indice de utilizare de peste 0,35 pentru toate afecțiunile exceptând refluxul gastroesofagean și diverticulul esofagean. **Concluzii.** Prânzul baritat a fost solicitat de către clinicieni în situații improprii ca examen de rutină pentru dispepsii, pentru urmărirea ulcerului peptic și în cazuri de hemoragii digestive. Examenul radiologic a fost repetat la 65,8% din cazuri. Se recomandă implementarea de urgență a recomandărilor pentru clinicieni pentru a ști precis care dintre cele 2 metode investigate de noi este recomandată în anumite situații clinice.

Cuvinte cheie: studiu clinic randomizat, prânz baritat, endoscopie, eficacitate

INTRODUCTION

The gastrointestinal x-ray examinations in Romania are the first contributors to collective dose, taking the place of

chest examinations, which have had the higher contribution in 1990 (1).

The analysis of the survey of diagnostic X-ray examinations showed that in 2000:

- the annual mean effective dose of the lower gastrointestinal examination was the second contributor in children group;
- the annual collective dose of the upper gastrointestinal examination was the fourth contributor in general population (2,3).

A useful investigation is one in which the result (positive or negative) has the effect of alteration of the management or addition of the confidence to the clinicians diagnosis. A significant number of radiological investigations do not fulfill these aims and many add unnecessary to patient irradiation (4). In childhood when the whole span of life and reproductive period lie ahead greater care is required. Examinations unlikely to have a fruitful yield or which merely duplicate information obtainable by other means and the frequent follow-up X-ray examinations are to be avoided (5).

A wasteful use and a poor efficacy of upper gastrointestinal tract examinations both for the adults and for the children have been found (6, 7). The main causes of the wasteful use of radiology are: repeating investigations which have already been done, investigations when results are unlikely to affect patient management, often and wrong investigations (4).

The objective of our clinical randomized study was to examine the value of radiological investigation (barium meal examination) vs endoscopy and to evaluate the efficacy of barium meal examination in children and teenagers.

MATERIAL AND METHODS

The group consists of 675 patients: 410 inpatients (aged 4 month-18 years) diagnosed with chronic gastrointestinal disorders hospitalized at "St. Mary" Hospital Iași (the only pediatric endoscopy department from Northeast of Romania) and 265 outpatients from Students Hospital Iași. The diseases which were taken into the consideration were esofagitis, gastritis, gastroesophageal reflux (GER), esophageal stricture, esophageal diverticula, hiatus hernia, Mallory-Weiss syndrome, peptic ulcers (esophageal, gastric or duodenal), gastro-intestinal (GI) bleeding. All the patients included in our study were investigated from the radiological and endoscopical points of view. Most of the patients (84%) are diagnosed in other hospitals and the laboratory tests have been performed in order to follow-up the evolution of the diseases.

The following information was obtained from medical files:

- the presumptive and final diagnosis;
- the date of referral for radiological and endoscopical examinations;
- the radiological and endoscopical diagnosis;
- the results of bacteriological examinations (*Helicobacter pylori* presence).

The final diagnosis was use as reference standard. The sensitivity, specificity, efficiency, predictive values (PV+ and PV-) and usefulness index (UI) of the diagnostic methods were calculated (7, 8).

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The indices were calculated for each disease group taking into account that predictive values are dependent on the disease prevalence.

The useful index (UI) ranges from -1 to +1. The tests, in which the UI values are greater than 0.35, are regarded as useful and are significant for the interpretation of the method.

RESULTS AND DISCUSSION

Age and sex distribution of patients in our study shows that out of 410 subjects 222 (54%) were females and 188 (46%) males in the inpatients group. The most pupils in the outpatients group (265 subjects) were

female too (62.3% vs 37.7%) The frequency was tenfold higher for males than for females (2.44 vs 0.24) in infant inpatients group. The sex distribution was quite equal in 1-4 and 5-8 years age groups. There were higher frequencies of females in all outpatients' age groups except 7-9 years.

The esophagogastroduodenal disorders were the most frequent after 9 years old (61% for inpatients group and 84.5% for outpatients group). The most inpatients are diagnosed with esophagitis and gastritis (64.8%) or gastritis (14.9%) as figure 1 shows.

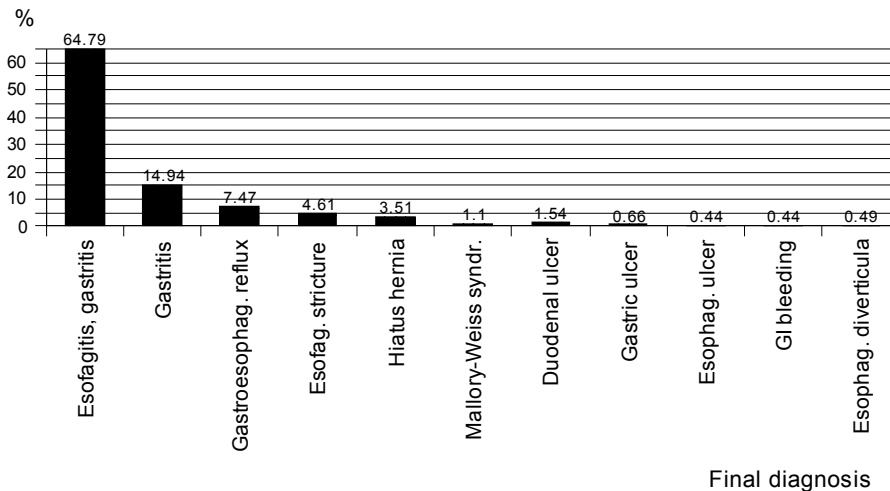


Fig. 1 Clinical diagnosis after laboratory test (%)

The diagnosis is best made by observation because radiographs are insensitive in revealing the severe and moderate esophagitis (10). The gastroesophageal reflux (GER) was

present in 7.47% of subjects, esophagus strictures in 4.61% of children and hiatus hernia in 3.51% of patients. The ulcers frequency was lower: 1.54% duodenal, 0.66% gastric and 0.44%

esophageal. It must be noticed that 1.10% of cases have Mallory-Weiss syndrome and 0.44% of subjects have gastro-intestinal bleeding. These lesions are not seen on upper GI X-ray examinations and diagnosis is made during endoscopic evaluation (8, 9). The gastritis was the most frequent disease in outpatients (73.2%) and only a quarter has had peptic ulcers (26.8%).

In most cases the clinician's supposition before the laboratory test was gastritis (47.9%) followed by gastroesophageal reflux (16.48%) (fig. 2). Superficial mucosal lesions such as esophagitis and gastritis are much more detected endoscopically (in 75-90% of patients versus less than 50% with radiological examinations (5). At 15.8% of patients the presumptive diagnosis was not recorded in medical files.

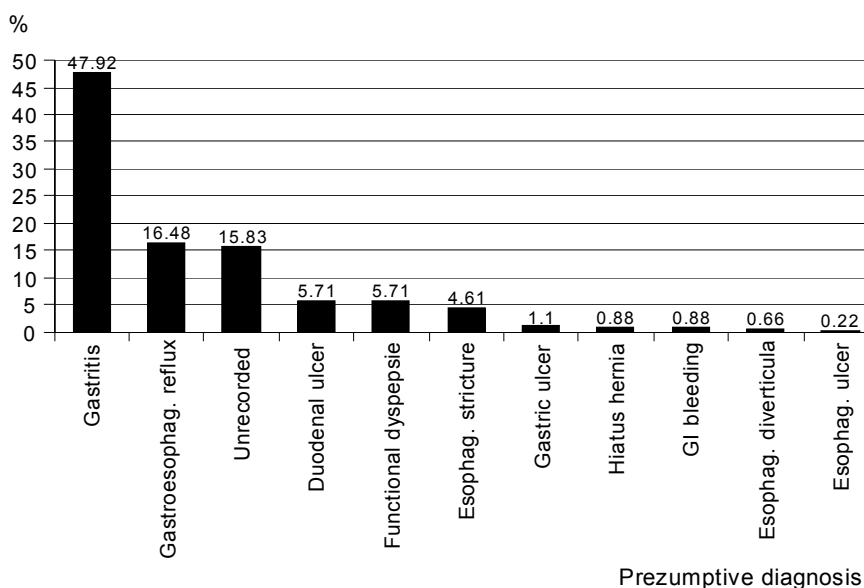


Fig. 2 Clinical diagnosis before laboratory test (%)

The barium examination of esophagus had the same value of the investigated indices as the endoscopy in esophageal stricture (table 1). The esophagoscopy presents the advantage that the procedure can be used to diagnose and treat the disease too (4, 8, 11). The sensitivity, efficiency and useful index were higher for barium meal exams vs

endoscopy in gastroesophageal reflux (GER). The barium studies are not indicated routinely in GER which is very variable and are best diagnosed clinically (9). False positive and falls negative X-ray examinations are common in GER (30% and 14 % respectively) (10).

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Table 1. The indices of diagnostic value of barium meal examination vs endoscopy by disease group

| Indices | Inpatient + Outpatient Barium meal X-ray | Outpatient Endoscopy |
|---------------------------|---|-------------------------|
| Sensitivity | | |
| Gastroduodenal ulcer | 0.45 | 0.83 |
| Gastritis | 0.82 | 0.99 |
| Specificity | | |
| Gastroduodenal ulcer | 0.67 | 1.00 |
| Gastritis | 0.63 | 1.00 |
| Predictive value + | | |
| Gastroduodenal ulcer | 0.94 | 1.00 |
| Gastritis | 0.98 | 1.00 |
| Predictive value - | | |
| Gastroduodenal ulcer | 0.09 | 0.69 |
| Gastritis | 0.12 | 0.75 |
| Efficiency | | |
| Gastroduodenal ulcer | 0.45 | 0.88 |
| Gastritis | 0.81 | 0.99 |

Barium meal examination had a higher sensitivity and PV+ in esophageal diverticula.

The barium meal examination was not sensitive and had no PV + in esophagitis, hiatus hernia, Mallory-Weiss syndrome, peptic ulcers and upper GI bleeding.

The endoscopies had a UI above 0.35 for all diseases, excepted GER and esophageal diverticula. The endoscopies can be performed in order to obtain biopsy using special techniques to put in evidence the presence of *Helicobacter pylori* which prevalence is higher in population living in unsanitary conditions. In our study the frequencies of *Helicobacter pylori* were 40% of total patients and 53% of inpatients with gastritis. The strong correlation between primary duodenal ulceration and *Helicobacter pylori* described in

adult (95% to 100 %) is also found in children (10).

Endoscopy is generally the only way to identify esophageal ulcer or esophagitis and acute gastric or duodenal ulcers. This procedure is indicated to evaluate dyspepsia and many clinicians recommended endoscopy over radiological examinations as an initial laboratory test (4, 9). Both false positive (up to 63%) and false negative (up to 56%) radiological diagnosis of peptic ulcers have been documented when compared with endoscopic findings (10).

The analysis of diagnostic strategy pointed out that in the majority of cases (96%) the barium meal examinations were requested before the endoscopy was performed and only in 3.6% of patients radiological studies were performed after endoscopy (fig. 3).

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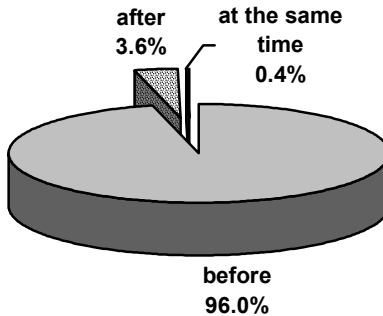


Fig. 3 The clinician request of barium meal examinations relatively to endoscopy (%)

The clinicians requested at the same time both endoscopy and x-ray exams at 0.4% subjects. In over a half of

patients (56.2%) the barium meal examination was requested for dyspepsia (fig 4).

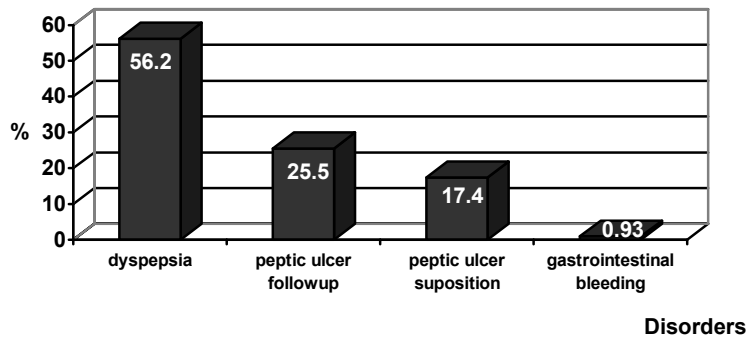


Fig. 4 The request of barium examinations by type of diagnose (%)

The barium meal examination was requested in inappropriate situations such as: dyspepsia (routinely), peptic ulcer (follow-up) and GI bleeding. As well as with upper GI bleeding endoscopy is the most sensitive and specific diagnostic test (10). A lower frequency of repeated barium exams in the last two groups period was noticed and a higher frequency in the

group 0-3 month aged in the inpatients group vs outpatients group (table 2).

One important way to reduce the unnecessary investigations is to avoid the investigation too often (i.e. before the disease could have progressed or resolved or before the result could influence treatment) (10). In 65.8% of cases the radiological examination was repeated. The 1997 EU directive requires all concerned to reduce

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unnecessary exposure of patients to radiation. One important way to reduce the radiation dose is to avoid undertaking investigations unnecessarily (especially

repeat examinations). Clinicians should always ask patients whether or not an investigation has been carried out already (4).

Table 2. The frequency of the X-ray examination repeat (%)

| Patients | Period before prior examinations (months) | | | |
|------------|---|------|------|----------|
| | 0-3 | 4-6 | 7-12 | > 1 year |
| Patient | 75.0 | 54.5 | 30.0 | 30.0 |
| Outpatient | 25.0 | 45.5 | 70.0 | 70.0 |

The main cause of the repeat barium meal examination was the lost of medical documents or clinician distrust

of radiological findings from other radiological department (fig. 5).

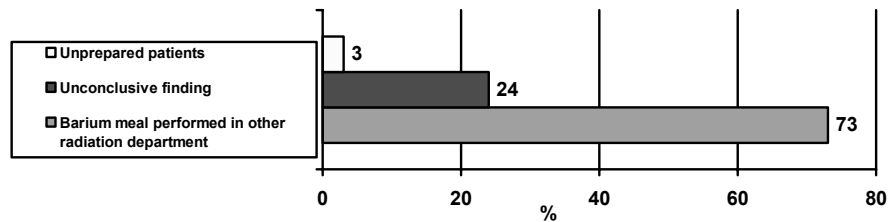


Fig. 5 The causes of the X-ray examinations repeat (%)

CONCLUSIONS

1. The radiological examination had a UI above 0.35 only for esophageal stricture but in this case the esophago-gastroscopy is recommended as diagnostically and as therapeutic procedure too for dilatation of esophageal stricture.
2. The endoscopy had a UI above 0.35 for all diseases, excepted GER and esophageal diverticula.
3. The barium meal examination was excessively (65.8% patients have repeated exams) and inappropriate requested in some diseases such as: dyspepsia (routinely), peptic ulcer

(follow-up) and gastrointestinal bleeding.

4. It is imperative to disseminate the guidelines for doctors clearly indicating the clinical context when these two diagnostic methods are to be recommended.

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