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Research Article / Araştırma Makalesi

The Utility of Fluoroscopic Contrast Studies in Demonstration of Upper and Lower Gastrointestinal Fistulas

Alt ve Üst Gastrointestinal Fistüllerin Gösterilmesinde Kontrastlı Fluoroskopik Çalışmalar

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Abstract: Our aim was to investigate the utility of conventional fluoroscopic contrast studies in detecting, localizing the upper and lower gastrointestinal (GI) fistulas and seeing their extensions. Our study included 24 patients between 1 month to 75 years of ages who were clinically suspected to have various types of GI fistulas. We administered water soluble iodinated contrast agents orally, percutaneously and rectally in an appropriate way in each case to demonstrate the fistulas. The cases were etiologically classified. We were able to demonstrate orocutaneous/thyroglossal (n=1), tracheoesophageal (n=4), esophagopleural (n=4), gastrocolic (n=1), duodenorenal (n=2), duodenocutaneous (n=1), enterocutaneous (n=2), enterovesical (n=1), colocutaneous (n=1), colovesical (n=1), rectovesical (n=1), rectovaginal (n=1), anorectocutaneous (n=4) fistulas and their extensions effectively. Iatrogenic etiologies (surgery, radiotherapy etc.) were found to be the leading cause of GI fistulas by 11 patients out of 24 (45.8%). Since we are able to see contrast material flow real-time, make selective studies and get highest spatial resolution images in different projections, we conclude that conventional fluoroscopic contrast studies remain to be the radiologic method of choice particularly for the initial imaging of various types of GI fistulas.

Key words: small intestine; colon; fluoroscopi; fistula

Özet: Üst ve alt gastrointestinal (GI) fistüllerin saptanmasında, yerlerinin belirlenmesinde ve uzanımlarının görülmesinde konvansiyonel fluoroskopik kontrastlı çalışmaların yararlılığını araştırmayı amaçladık. Çalışmamıza, klinik olarak çeşitli tiplerde GI fistülleri olduğu düşünülen, yaşları 1 ay ile 75 yaş arasında değişen 24 hasta dahil edildi. Fistülleri göstermek için suda çözünür iyotlu kontrast ajanlar her olgu için en uygun şekilde oral, perkütan veya rektal yoldan verildi. Olgular etiyolojik olarak sınıflandırıldı. Fistüllerin, orokutanöz/tiroglossal (n=1), trakeoözofageal (n=4), özofagoplevral (n = 4), gastrokolik (n=1), duodenorenal (n=2), duodenokütanöz (n=1) , enterokutanöz (n = 2), enterovezikal (n=1), kolokütanöz (n = 1), kolovezikal (n=1), rektovezikal (n=1), rektovajinal (n=1), anorektokütanöz (n= 4) olduğu ve uzanımları etkin olarak gösterilebildi. İatrojenik etyolojiler (cerrahi, radyoterapi vb.), 24 hastanın 11'inde (%45.8) GI fistüllerin başlıca nedeni olarak tespit edildi. Kontrast madde geçişini gerçek zamanlı olarak görebilmemiz, seçtimiz bölgeye yönelik çalışabilmemiz, farklı projeksiyonlarda yüksek uzaysal çözünürlükte görüntüler elde edebilmemiz nedeniyle, değişik türlerde GI fistüllerin ilk görüntülemesinde konvansiyonel fluoroskopik kontrastlı çalışmaların tercih edilen radyolojik yöntem olmaya devam ettiği sonucuna vardık.

Anahtar Kelimeler: ince barsak; kolon; sineradyografi; fistül

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1. Introduction

Gastrointestinal (GI) fistulas may develop in various locations of GI tract due to iatrogenic procedures such as complicated surgical operations and radiotherapy, infectious and inflammatory etiologies, neoplasias and traumas. Various radiological methods have been used for the demonstration of GI fistulas, such as ultrasonography (1, 2), fluoroscopic contrast studies (3) computed tomography (CT) (4-6) and magnetic resonance (MR) imaging (7-9). MR imaging is a promising tool for the imaging of fistulas. While T2-weighted (W) MR images (particularly the fat-suppressed ones) can clearly demonstrate the contrast between the hyperintense fluid within the fistula tract and its hypointense wall, contrast-enhanced T1W images are generally successful in isolating the hypointense fistula tract from the inflamed area thanks to the enhancement of the tract wall and any associating abscess wall (7). However MR fistulography is a relatively costly imaging modality which has to be performed for the patients who do not have any contraindication for MR imaging such as cardiac pacemakers, cochlear implants etc.
In the evaluation of GI fistulas first choice is a fistulogram or a sinogram. Fistulograms are the fastest and relatively low-cost imaging methods to demonstrate the connection of a cutaneous opening with the GI tract. Sometimes it may be the only imaging modality that is needed (10-12). We aimed to investigate the efficacy of conventional fluoroscopic contrast studies in detecting and localizing the upper and lower GI fistulas and seeing their extensions

2. Materials and Methods

Our study population included 27 patients who were clinically suspected to have various types of GI fistulas in the first selection. Three of them were excluded because of patient noncompliance or due to the technical difficulties to complete the studies. Twenty-four patients who uderwent a fluoroscopic contrast study for demonstration of GI fistulas between years 2000-2001 and 2009-2012 were included in this retrospective study. The study was performed in accordance with institutional ethical guidelines and conformed to the World Medical Association Declaration of Helsinki (revised in 2000, Edinburgh). All the adult subjects and the parents of the pediatric patients were informed about fluoroscopic studies and consent was obtained from them. The mean age of the patients was 40.2 years (range, 1 mo-75 y). Fifteen of the patients were male (62.5%) and nine of them were female (37.5%). We administered water soluble non-ionic iodinated contrast material (CM) for the demonstration of the fistulas.
According to the possible location of the fistula, we used CM orally, rectally or through the orifice of the fistula on the skin using proper gauge cannulas. Pulsed fluoroscopy technique to minimize radiation exposure was performed during the studies. Fistulas were detected by real-time visualisation of CM flow and by obtaining radiographs at the same time.

Data analysis

The mean age of the patients, the frequencies (percentage, n) of the patients according to the location (type) and etiology of the fistulas were obtained. All analyses were done with SPSS software (version 16.0; SPSS Inc; Chicago, IL, USA)

3. Results

The etiologies of the fistulas were classified and given in Table 1. Iatrogenic etiologies (surgery, radiotherapy etc.) were found to be the leading cause of GI fistulas by 11 patients out of 24 (45.8%). Infectious etiology such as perianal abscess, pyonephrosis etc. was the second leading cause by 5 patients out of 24 (20.8%). The other causes of GI fistulas were summarized in Table 1. The fistulas themselves were mainly classified as upper GI fistulas (54.2%, n=13/24) and lower GI fistulas (45.8%, n=11/24) with respect to their being proximal or distal to the Treitz ligament, though in one case a gastrocolic fistula was demonstrated between upper and lower GI tract and was included in upper GI fistula group due to its proximal orifice being in connection with the stomach lumen. We

were able to demonstrate orocutaneous/thyroglossal (4.2%, n=1/24), tracheoesophageal (16.7%, n=4/24), esophagopleural (16.7%, n=4/24)(figure 1), gastrocolic (4.2%, n=1/24), duodenorenal and duodenocutaneous (12.5%, n=3/24), enterocutaneous (8.3%, n=2/24), enterovesical (4.2%, n=1/24), colocutaneous (4.2%, n=1/24), colovesical (4.2%, n=1/24), rectovesical (4.2%, n=1/24), rectovaginal (4.2%, n=1/24), anorectocutaneous-rectocutaneous 16.7%, n=4/24) (figure 2) fistulas and their extensions effectively. In 15 cases (62.5%) surgery was performed after fluoroscopic contrast studies. In these cases, radiologic diagnoses were consistent with surgical results. In the other nine patients no surgery was performed but radiological diagnoses seemed compatible with clinical data and follow-up results.

Table 1. Distribution of the frequencies (percentage, n) of the patients according to the etiology of the fistulas.

Etiology	Percentage (n)
Iatrogenic (surgery, radiotherapy)	45.8% (n=11/24)
Infection (perianal abscess, pyonephrosis)	20.8% (n=5/24)
Congenital (orocutaneous / thyroglossal tracheoesophageal fistula)	12.5% (n=3/24)
Malignancy (esophageal adenocarcinoma)	8.3% (n=2/24)
Traumatic	4.2% (n=1/24)
Crohn's disease	4.2% (n=1/24)
Vigorous vomiting	4.2% (n=1/24)

n: number

Figure 1. Esophagopleural fistula in an adult male patient (arrow). Nonionic water-soluble contrast material was administered orally.

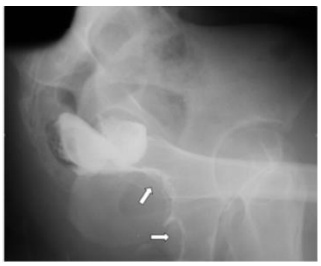

Figure 2. Rectocutaneous fistula in an adult female patient (arrows). Nonionic water-soluble contrast material was given through the orifice of fistula on the perineum.

4. Discussion and Conclusion

Thyroglossal cysts and fistulas are the most common type of cysts and fistulas in the mediocervical region. Fistulas may occur after infections and inflammations of related structures and may also develop postoperatively. The treatment of choice is complete excision of the cyst and fistula tract. Complete resection reduces the risk of recurrences and secondary malignant degeneration (13). Leaks from esophagogastric and esophagojejunal anastomoses into lung parenchyme, mediastinum (esophagomediastinal fistulas) and pleural space (esophagopleural fistulas) are not uncommon complications of esophagogastrectomies. They can develop both in early postoperative period (5%-29% of cases) and in the late postoperative period (16% of cases) (14). Esophagotracheal and esophagobronchial fistulas may develop as a result of esophageal carcinomas. Tracheoesophageal fistulas may also occur congenitally and are usually diagnosed in early infantile period since they can cause aspiration and recurrent pulmonary infections. Esophagopleural and esophagomediastinal fistulas may also develop after vigorous vomiting episodes as a result of full thickness esophageal ruptures. Pyeloduodenal (duodenorenal) fistulas may occur because of urinary stones (especially staghorn type stones), xanthogranulomatous pyelonephritis, interventional procedures such as percutaneous nephrostomy and nephrectomy, ingestion of foreign bodies and penetrating traumas. Radiotherapy in pelvic malignancies may have potential to cause chronic radiation injury to small and large bowel. Local ischemia and fibrosis after radiotherapy lead to ulcers, strictures, lower GI tract bleedings and fistulas (15, 16). These fistulas are colovesical, enterovesical, ileorectal and rectovaginal. In patients with GI fistulas, previous radiotheraphy procedure is an indicator of unfavourable prognosis and in these patients the expectation for spontaneous closure is minimal (17). Previous surgical operations related to abdominal and pelvic structures (18), traumas, perianal and GI tract infections and infestations are among the other causes of GI fistulas. From the point of etiologies, history and clinical data in all of our patients were compatible with the literature mentioned above. Therefore, we recommend obtaining detailed history in all the patients before performing GI fistulography.

When we analyzed the etiologies of our GI fistula patients, we found that iatrogenic etiologies (surgery, radiotherapy) were the leading causes of GI fistulas 11 patients out of 24 (45.8%). This result is compatible with the result of Rose et al. (19), who have found the rate of surgical etiologies in GI fistulas as 51%, in a series of 108 patients. In the present study, infectious etiologies such as perianal abscess, pyonephrosis etc. was the second leading cause by 5 patients out of 24 (20.8%).

Fistulograms provide quick and direct information with minimal patient discomfort or cost, thanks to the real-time images with high spacial resolution that can be evaluated immediately. Fistulograms are sufficient for the diagnosis in most cases, and in some studies it has been reported that up to 85% of fistulograms provide sufficient data (4, 12, 20).

Our relatively small number of patients can be considered as a limitation. However, despite the limited number of patients, we could be able to demonstrate almost all types of GI fistulas. We did not compare our findings with other modalities such as CT fistulography or MR fistulography and did not verify our diagnoses by other imaging tools since our study was retrospective. MR imaging is quite effective to demonstrate the fistulas (i.e. perianal) because of its high contrast resolution and its ability to clearly depict the anatomical structures and extension of the fistula tract in all planes (7, 21). This can also be accepted as a limitation. However, in majority of cases the diagnoses were straightforward without any need for further imaging due to clear depiction of the fistula tract anatomically, though we verified our findings by surgery and clinical evaluation including follow-ups in all cases.

In conclusion, since we are able to see CM flow real-time, make selective studies and get highest spatial resolution images in different projections, we conclude that conventional

scopic contrast studies remain to be the radiologic method of choice in imaging of various types of GI fistulas.

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