

Diagnosis of Fistula-in-Ano: An Innovative Approach

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Abstract

Fistula-in-ano is a common condition that occurs due to inadequate drainage or spontaneous bursting of a perianal abscess. It often recurs after best of surgery usually because of infection that was missed at surgery. Preoperative imaging can help identification of infection that would have otherwise gone unidentified. In particular, magnetic resonance imaging (MRI) findings have been claimed to influence surgery and markedly diminish the chance of recurrence according to recent reports. But in countries like India, this is not possible for majority of patients to afford MRI because of cost effectiveness and non-availability of MRI facility at common centers. Therefore, still fistulography is commonly used for preoperative imaging of fistula-in-ano. In the present work, fistula-in-ano and its imaging techniques are described, with an emphasis on fistulography by Deshpande technique.

Keywords: Fistula-in-ano, Fistulography, Deshpande technique

Introduction

Fistula-in-ano is a troublesome disease and is characterized by presence of a tract lined by granulation tissue, which connects deeply in the anal canal or rectum and superficially on the skin around the anus. It usually results from an anorectal abscess which bursts spontaneously or was exposed inadequately. It has been classified into several types by different scientists – (A) low anal, high anal and pelvirectal or supralevator type; (B) low anal, trans-sphincteric, inter-sphincteric (low or high), pelvirectal.

Diagnosis of fistula-in-ano is done by following measures:

- Digital rectal examination where internal opening can be felt as nodule on the wall of the anal canal.
- Proctoscopy may reveal internal opening. A hypertrophied papilla is suggestive of that the internal orifice lies within the crypts related to the papilla.
- Probing – earlier this was universal practice but not recommended now because pain and false passage may be created due to forceful probing.
- Radio imaging techniques like fistulography, CT scan, MRI, transcutaneous perianal/endoanal or endorectal ultrasonography are used for diagnosis of fistula-in-ano. CT demonstrates thickness of the muscles (puborectalis sling and external anal sphincter) whereas MRI reveals structure of muscles in multiple planes, i.e., axial, coronal and sagittal. Endoanal or endorectal/transcutaneous perianal ultrasonography and MRI are being used at higher centers for ‘mapping’ of complex fistulae. In Ayurvedic classics, these conditions are described under the title “Bhagandara” and their diagnostic tools are named as different types of *Yantras*. Fistulography will be discussed in detail in this article.

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A treatment of this disease is surgery but that has high incidence of recurrence. In Ayurveda, the “Kshar sutra” therapy is a successful treatment modality.

Fistulography

For many years, radiologists have attempted to help answer the surgical questions with varying degrees of success. Contrast material – enhanced fistulography was the first modality used. In fistulography, the external opening is catheterized with a fine cannula, and a water-soluble contrast agent is injected gently to define the fistula tract. Fistulography was employed in 1917 by Pennington. Morby and Morgan described method by using lipiodiol. Moller and Sullivan (1969), Dull (1947) used lipiodiol to demonstrate the sinus cavities. Pendergrass and Wond (1947) emphasized the use of iodized oil in the demonstration of six cases of complicated fistulae involving the spine. Corall and Ebert (1966) described a technique of investigating the extent of penetrating wound of abdominal wall. The technique involves introducing a catheter into the wound and injecting contrast media through it. They reported accuracy of diagnosis in no cases. Goligher (1961) was not convinced of the usefulness of this investigation. Sometimes this investigation fails to demonstrate fistulous tract. The failure is mostly due to method adopted. Lilius (1968) did fistulography in 23 cases in which examination failed in 13 cases. Fistulous tract was well visualized in 10 cases along its course. In four cases, connection with the anal canal was established. Meller and Sullivan (1969) mentioned that the examination of fistulae and sinus tract is best done under fluoroscopic control. He established that water-soluble contrast material is preferable than lipiodiol. He described three techniques: in the first technique, he used long catheters which are used in retrograde arterial studies through which contrast media was injected. In fistulae with multiple openings he advised to use one catheter for each opening. He also mentioned to use double contrast media including air where the fistulous cavities are low and making roentgenograms in various positions to elicit the outline of the cavity. In the second technique, he used conical rubber nozzle placed on a syringe. In the third technique, he used red rubber catheter in the tract and injecting contrast media through it and catheter can be sutured in place. He also mentioned the use of Foley’s catheter with balloon inflated in large chronic sinuses to occlude the cavity. Severini (1972) mentioned that visualization of the course of an external fistula by means of radio-opaque contrast media depends upon maintaining enough pressure to

dilate the cavity of the lesion. This means to prevent backflow of the contrast media from the external orifice. To prevent this backflow Pandergren and Wond (1947) used screw tubes. Suction devices have been invented on the same principle as for the HSG is in routine use with the injection kit being made to adhere to the surrounding of the orifice of the fistula by creating a vacuum in the cup resting on the skin (Brekken and Axen 1968, Almen 1965) as mentioned by Severini (1972). The method of fistulography adopted by Severini (1972) is based on the action principle like Brekken and Axen (1968) and Almen (1965). The materials used in the method are (1) a glass cup containing vacuum created by a mechanical pump; (2) A needle at the center of the cup for injecting contrast material (there is a bulb near the end of the needle which tapers off sharply just before the tip; and (3) Long rubber or polythene tube containing stop cock at one end which can be fixed with the glass cup, another end is attached to the syringe containing contrast material; by this method operator escapes from irradiation. Severini (1972) also mentioned to use different types of glass cups according to the position of the external opening of the fistula. He mentioned to use both fat and water-soluble media but preferably water-soluble (as Meller and Sullivan (1969) which absorbed better by surrounding tissues of the fistulous tract and mixed better with the exudates of fistulae. Gabriel (1962) stated that fistulography is beneficial to complicated fistulae only. Ahlback et al (1974) mentioned that fistulography should always be done in relapsing and high anal fistulas. Diagnosis with help of fistulography can cause rectal fistula. New method of fistulography was adopted by them in 93 patients. A Clausen rectal catheter with a balloon and a solid rubber ball having 35 mm diameters was taken. Balloon was inflated within rectum by which the ball was pressed against the anus and anal canal was thus defined in between. Urograffin 60% was injected during fluoroscopy through a Nelaton catheter wide enough to occlude external opening of fistula. Full size films were taken in frontal, lateral and oblique projections. Clinically they classified fistula in ano into low anal, high anal and anorectal or pelvirectal varieties. The boundary between low anal and high anal is the dentate line or pectinate line. This line is not demonstrable radiologically. They consider it to be 15 mm above the anal opening. Boundary between high anal and pelvirectal is puborectal loop part of levator ani which is also not demonstrable. They considered it to be above 30 mm above anal opening. Radiological findings were confirmed in 67 out of 93 cases. Very little has been written on fistulography for fistula-in-

ano, probably because the modality is so fraught with errors. Kuijpers and Schulpen attempted to determine its value by retrospectively reviewing fistulographic images in 25 patients. They found that the internal opening and associated extensions were demonstrated and correctly interpreted in only four (16%) subjects. Moreover, false-positive diagnosis of rectal openings and supralelevator extensions were made in three (12%) patients, which would have resulted in serious surgical errors, if acted on. They concluded that fistulography was "inaccurate and unreliable," although they admitted prior bias against the technique. In contrast, Weisman and co-workers found fistulography to be more useful in that it provided helpful information in nearly half of the 27 subjects in their study.

It has been suggested that the prime reason why fistulography is generally unhelpful is that radiologists are not familiar with the concepts of fistula pathogenesis and anatomy and the relevant surgical questions. One of the most hazardous misinterpretations is to diagnose a direct rectal opening merely because there is contrast material in the rectal lumen; usually, the contrast agent has merely refluxed up from the internal anal opening. Such radiology reports only encourage the surgeon to look for nonexistent openings and extensions, which

can result in iatrogenic secondary tracts. The fistulography will be presented here as conventional fistulography and Deshpande technique for understanding of the present work.

Conventional Fistulography

Conventional fistulography, although in practice did not solve the purpose of surgeons because it has two major drawbacks. First, extensions from the primary tract may fail to fill with contrast material if they are plugged with debris, are very remote, or there is excessive contrast material reflux from either the internal or external opening. Second, the sphincter muscles themselves are not directly imaged, which means that the relationship between any tract and the sphincter must be guessed. Furthermore, an inability to visualize the levator plate means that it can be difficult to decide whether an extension has a supra- or an infralevator location. Similarly, the exact level of the internal opening in the anal canal is often impossible to determine with sufficient accuracy to help the surgeon. The net result is that fistulographic findings are both difficult to interpret and unreliable. Specially anatomical correlations of fistulous tract with anal canal and rectum and internal opening are of prime importance which cannot be expressed with this technique.

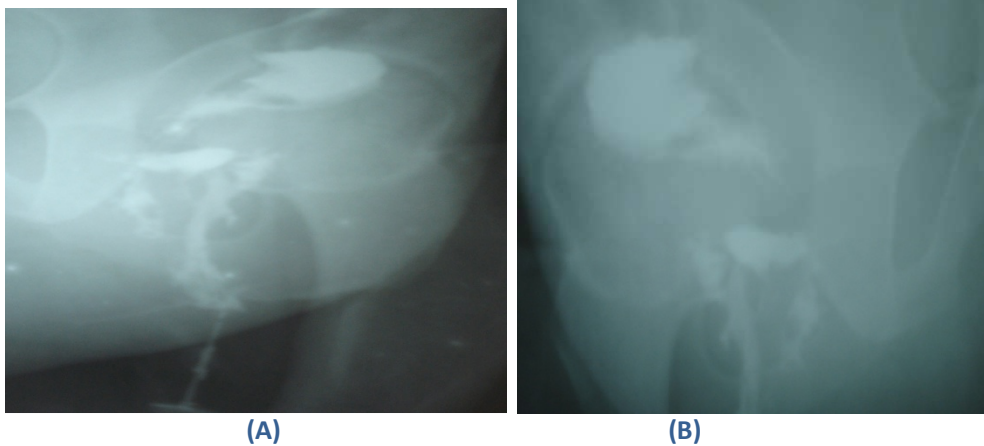


Figure (1) A & B. Conventional Fistulography in a Male Patient

Coronal images show that there are several high extensions surrounding the anorectal junction; however, the exact anatomical location of these is unclear because the anal canal and rectum cannot be directly visualized.

Unacceptability of fistulography technique has almost made this technique unreliable. But a different technique of fistulography is in practice since long in the Department of Shalya Tantra, Faculty of Ayurveda, Institute of Medical sciences, Banaras Hindu

University, Varanasi, which is known as Deshpande technique. Deshpande et al. devised a new technique which is almost similar to the method of Ahlback et al. (1974) except that in place of solid rubber ball he used lead marker and condom in place of balloon.

Materials and Methods

100 patients were selected from anorectal OPD of Sir Sunder Lal Hospital, BHU, Varanasi, and they were examined by Deshpande technique of fistulography;

comparative conventional fistulography of some of the patients was done to evaluate the difference between two techniques of fistulography. Fistula-in-ano with multiple openings, high anal fistulae, pelvirectal/ supralelevator type of fistulae, fistulae communicating with other viscera like urinary bladder, etc., were included in the present study. Fistulae with acute infections and patients having hypersensitivity to radio opaque contrast agents were excluded from the study. Low anal fistulae were also not taken into consideration because fistulography in these cases did not reveal significant information.

Deshpande Technique

In this technique, a rubber catheter is taken and a condom is tied over the tip of the catheter with the help of thread, whereas an inflating bulb of a

sphygmomanometer is fixed with lower part of the catheter for air introduction in the condom. Infant feeding tube of suitable size (depending upon width of external fistulous opening) is taken for injection of dye into the tract. Two lead markers are used in this technique – one is fixed with rubber catheter to mark the external anal opening whereas the other is fixed with infant feeding tube to mark the external fistulous opening. Now rubber catheter is introduced into the anal canal and air is introduced in the condom to inflate it, once the condom is inflated, catheter is slightly withdrawn outwards and is left at the place when there is feeling of slight resistance (because anal sphincter tries to hold it in place), the lead marker is fixed to mark the external anal opening. Infant feeding tube is introduced into the fistulous tract and it is fixed with the help of adhesive tape at the external fistulous opening along with the lead marker.

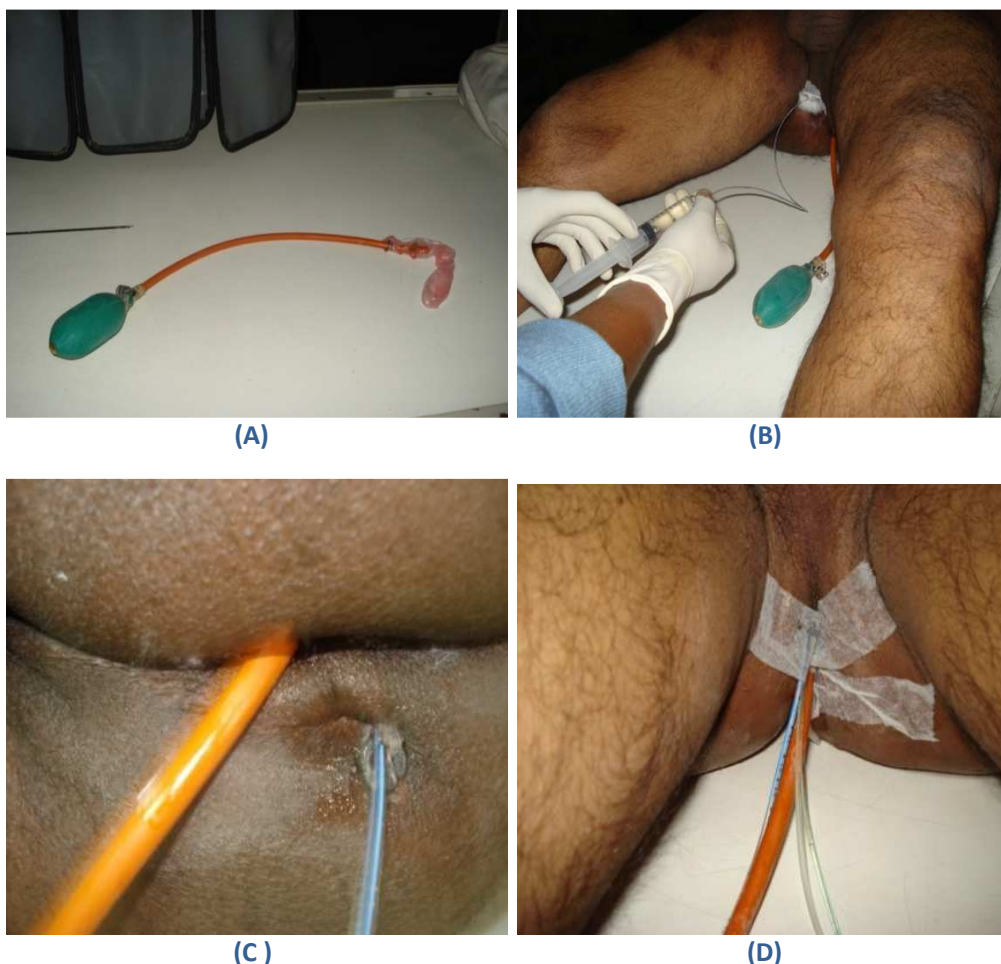


Figure 2. Deshpande Technique of Fistulography. (A) The Marker and Device Used. (B) AP View Method. (C) Lateral View Method. (D) AP View with Two External Openings

Now the contrast agent Lipiodol is injected into fistulous tract with the help of syringe fitted to the infant feeding tube. X-ray is taken commonly in antero-posterior and lateral views. Other views if required may be taken. In the X-ray films, air filled in

the condom marks the anatomical location of rectum whereas shadow of rubber catheter in the anal canal shows the anatomical location of anal canal. The shadow of lead markers shows the external fistulous and external anal openings. Smearing of contrast over

rubber catheter or condom indicates the presence of internal opening. Low anal, high anal and pelvirectal varieties are decided as in the technique of Ahlback et al (1974). Since there is potential space only in the rectum for the expansion of condom filled with air, therefore, the meeting point of inflated condom with the rubber catheter may be marked as imaginary location of anorectal ring, which is not demonstrable radiologically.

Deshpande technique has been tried in 100 patients of recurrent and high anal fistulae, which revealed following results. Low anal fistulae were not included

in this study because fistulogram done in these cases did not show remarkable findings. Anatomical marking of rectum and anal canal imaged by rectal catheter and inflated condom helps to establish the relation of fistulous tract with the rectum and anal canal. Internal opening and its location above or below the anorectal ring is identified with this technique. Ramifications, cavities and its relation to anal canal and rectum are expressed. Extent of fistulous tract can be identified. Communication with other viscera is also possible to be imaged (Figs. 5 and 6).

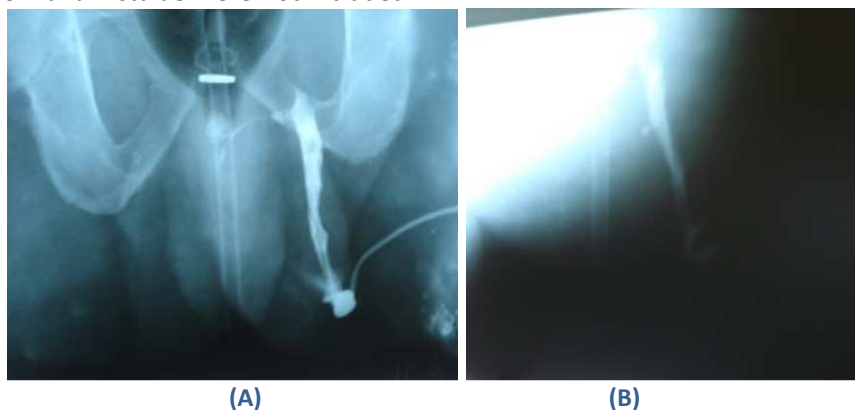


Figure 3.A and B Showing Fistulography by Deshpande Technique

Here presence of gas shadow in the rectum filled in condom marks rectum, whereas rubber catheter in the anal canal marks the anal canal. Junction of the

gas shadow and rubber catheter marks the level of anorectal ring. External fistulous opening and anal verge is marked by lead marker.

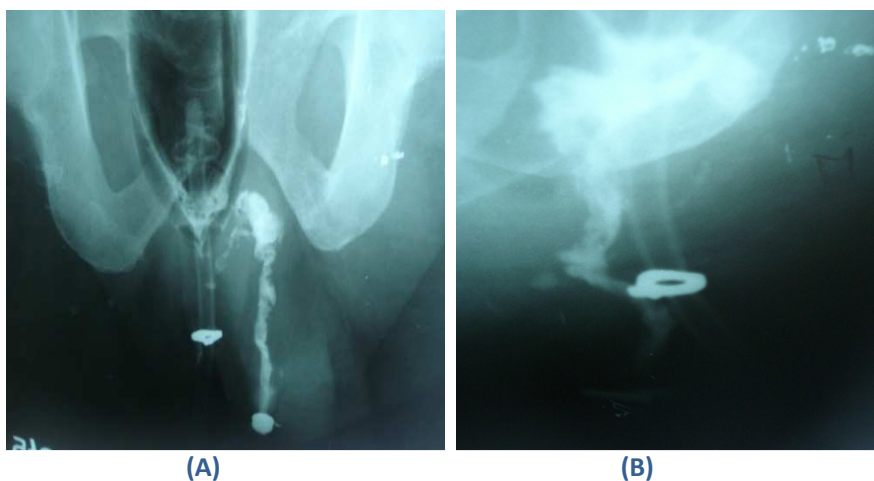


Figure 4.A and B Showing Fistulography by Deshpande Technique

Here contrast agent smeared over inflated condom shows internal communication. Course of tract its relation with anal canal, anorectal ring and rectum is seen. Although anorectal ring is not imaged but it is assumed at meeting point of part of anal rubber catheter and beginning of inflated part of condom. Lateral view shows perianal course of fistulous tract

and large fistulous cavity in perirectal space.

This technique is also useful in imaging of blind external fistulae. In such cases, infant feeding tube of appropriate size, or other suitable device (like wide bore spinal needle) is placed inside the fistulous opening (which lies somewhere inside anal canal) to inject the contrast agent into fistulous tract.

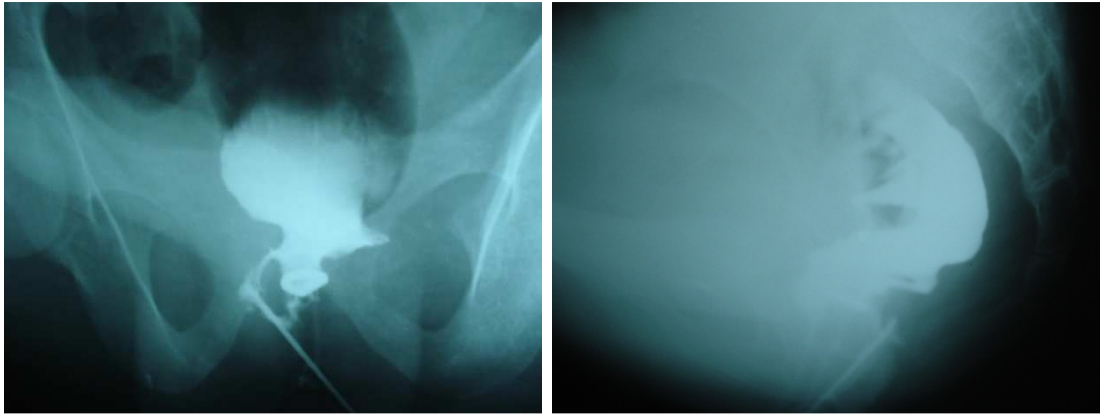


Figure 5.A & B Showing Fistulogram Done by Deshpande Technique AP & Lateral Views

Images show presence of large cavity in perirectal space and fistulous opening in the anterior anal canal.

The Deshpande technique is also useful in diagnosis of fistula of other than cryptoglandular origin.



Figure 6.A and B. Images Show Fistulogram Accompanied by Retrograde Urethrogram to Diagnose a Patient Presented Primarily as a Case of Fistula-in-Ano

Presence contrast in urinary bladder and rectum shows communication of fistulous tract with anal canal and urinary bladder. This case was diagnosed as fistula-in-ano other than cryptoglandular infection.

Advantages of the Technique

Despande technique makes possible imaging of anal canal and rectum with the help of markers (rubber catheter, condom filled with air and lead markers) and depicts relation of fistulous tract with anal canal and rectum. It also shows communication of fistulous tracts with neighboring structures, its internal opening and cavity. The imaging of course of fistulous tract, its ramifications along with outlining of fistulous cavities is possible with this technique. Direct imaging of anorectal ring is not possible but it may be measured as in Ahback technique. (The boundary between low anal and high anal is the dentate line or pectinate line. This line is not demonstrable radiologically. They consider it to be 15 mm above the anal opening. Boundary between high anal and pelvirectal is

puborectal loop part of levator ani which is also not demonstrable. They considered it to be above 30 mm above anal opening). Another method to mark the junction of anal canal and rectum is that since there is no potential space in anal canal to inflate the condom, whereas for inflation of condom there is potential space in the rectum. Therefore, the meeting point of inflated condom with the catheter may be marked as anorectal junction. This is imaged as meeting point of gas shadow with catheter shadow.

Disadvantages of the Technique

Although fistulography is now considered as unreliable but it is still the primary investigative procedure in our country. It has certain disadvantages like inability to demonstrate muscular anatomy, debris-filled tracts may be missed because of contrast fails to enter into blocked tracts, backflow of contrast agent causes false image formation and incomplete filling of tracts, contrast agent may enter inside the vessels and can cause hypersensitivity reaction,

Conclusion

In those patients with fistula fistula-in-ano who have a high likelihood of complex disease, the evidence that preoperative MR imaging influences the surgical approach and the extent of exploration and improves the ultimate outcome is now overwhelming in western countries. Recurrent fistula-in-ano is usually caused by infection that was missed during surgical exploration. It is claimed that MR imaging depicts remote foci of infection better than any other modality, including surgical exploration. But in developing countries like India where MR imaging is not freely available and is cost effective too, Deshpande technique of fistulography and anal endoanal sonography is a viable alternative to MR imaging. Endoanal sonography has some limitations, like it cannot be performed in perianal inflammatory conditions, anal fissures and anal stricture or stenosis, etc., whereas in these conditions fistulography by Deshpandey technique can be performed easily. The Deshpande technique is cheaper and needs only X-ray equipment along with some minor articles like rubber catheter, lead marker, condom and infant feeding

tube which are freely available even at smaller centers. Therefore, this technique should be adopted for primary preoperative imaging of fistula-in-ano whereas anal endosonography and MR imaging may be used at tertiary centers.

Conflict of Interest: None

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