

A retrospective analysis of transanal surgical management of 291 cases with rectal foreign bodies

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Abstract

Background: Rectal foreign bodies (RFB) are quite uncommon except in very busy hospitals. Because of their rarity, it is seldom that the treating physicians have a standard approach to the diagnosis, technique of extraction, and post-extraction evaluation. This can be further complicated by the rather extreme variability of size, shape, and texture of the foreign bodies, as well as the potential extent of trauma to the rectum or distal colon.

Aim: The objectives of this study were to delineate the demographics, classification of cause, and injury patterns of RFB, and to present the results of the transanal surgical management of a large series of RFB.

Methods: We retrospectively collected extensive data from the hospital medical records of the 291 patients who presented with RFB to the emergency department of Shenyang Proctological Hospital (Shenyang, China) from 2012 July to 2020 December. Specifically, demographics, origins and circumstance of the RFB, complications, injuries, anesthesia method and the results of the transanal surgical management were recorded and analyzed.

Results: Of the 291 RFB cases, 225 (77.3%) were male and 66 (22.7%) were female, with a mean age of 53.8 ± 15.5 years (range, 1–88 years). The circumstances of the RFB were categorized as swallowed, 199 cases (68.4%); self-inserted, 87 (29.9%); and iatrogenic, 5 (1.7%). The proportion of males in the self-inserted RFB group was significantly greater than the swallowed RFB group ($t=31.114$, $p=0.000$).

In the swallowed RFB group, the most common anorectal injuries and pathological changes were the following: penetration into the mucosa (75 cases, 37.7%), perianal or submucosal abscess (27 cases, 13.6%) and penetration into the anal canal (18 cases, 9.0%). In the self-inserted RFB group, 64 (73.6%) of the 87 cases had an intact rectum, whereas 8 (9.2%) had rectal mucosal ulcers and bleeding, and 7 (8%) had rectal lacerations. In the iatrogenic RFB group, 3 cases (60%) had rectal mucosal ulcers and bleeding, and 2 cases (40%) had inflammation of the rectal mucosa.

Regarding extraction procedures, in the swallowed group, 187(187/199; 94%) patients underwent a transanal surgical procedure, and all were successful. In the self-inserted group, 82 patients underwent the transanal surgical procedure, and 74 (74/82; 90.2%) were successful whereas it was unsuccessful in the remaining 8 patients (8/82, 9.8%). Three (3/4, 75%) patients with iatrogenic RFB were resolved by the transanal surgical procedure.

Conclusion: Men were markedly more likely than women to have swallowed RFBs and self-inserted RFBs. No serious damage to the rectum and anus was found in cases of swallowed RFB. Moreover, most surgical operations to remove foreign bodies via the anus were successful in this category of RFB. In contrast, rectal injury was more severe in patients with self-inserted RFB, such as rectal laceration, rectal mucosal ulcer, and bleeding. Moreover, the transanal removal operation in patients with self-inserted RFB had a failure rate of nearly 10%. Thick, long, hard foreign bodies did present a great challenge to the

operator. Therefore, if necessary, patients with foreign bodies may need to be promptly referred for transabdominal removal.

Introduction

Rectal foreign bodies (RFB) are relatively uncommon cases in the emergency department except in very busy hospitals. Previous publications reviewing RFB have consistently found that the principal cause of RFB has been voluntary insertion for sexual activity. However, our experience appears unique in that compared to the self-inserted RFB, the swallowed RFB were more common, such as animal bones and plant nuclei. In addition, iatrogenic RFB were quite rare. Because of their rarity, it is seldom that the treating physicians have a standard approach to the diagnosis, technique of extraction, and post-extraction evaluation. This can be further complicated by the rather extreme variability of size, shape, and texture of the foreign bodies, as well as the potential extent of trauma to the rectum or distal colon.

We performed a retrospective analysis of the RFB cases in our center from 2012 to 2020. The objectives of this study were to delineate the demographics, classification of cause, and injury patterns of RFB, and to present the results of the transanal surgical management of a large series of RFB.

Materials And Methods

Data Collection

We retrospectively collected extensive data from the hospital medical records of the 291 patients who presented with RFB to the emergency department of Shenyang Proctological Hospital (Shenyang, China) from 2012 July to 2020 December. Specifically, demographics, origins and circumstance of the RFB, complications, injuries, anesthesia method and the results of the transanal surgical management were recorded and analyzed. Continuous variables were expressed as means \pm standard deviation. Categorical variables were expressed as absolute and relative frequencies. Due to the low number of patients, a detailed statistical analysis was not performed. This study was approved by the Ethics Committee of the Shenyang Proctological Hospital (No.2021-01-05) and conducted according to the standards of the Declaration of Helsinki (as revised in 2013).

Diagnostic and therapeutic approach

The diagnosis of rectal foreign body was quite straightforward through the combination of the history and auxiliary examinations. However, some mistakenly swallowed RFB were not clearly described and the history of self-inserted RFB was often intentionally concealed. The digital anal examination was the most valuable, which provided key information about the location, size, shape, and texture of the foreign objects. After completing the history and digital examination, plain abdominal radiographs were sometimes obtained to confirm precise location and exclude bowel perforation. If spontaneous discharge of the RFB was impossible or associated bowel injury was suspected, or if patients had significant comorbidities, surgical treatment was carried out in the operating room.

Results

The study comprised 291 RFB in-hospital cases, including 225 (77.3%) males and 66 (22.7%) females with a mean age of 53.8 ± 15.5 years (range, 1–88 years). According to the source of the RFB entering the body, we divided the patients into 3 groups: the swallowed group (199 cases, 68.4%), the self-inserted group (87, 29.9%), and the iatrogenic group (5, 1.7%). The swallowed group had a mean age of 55.2 years (range, 1–88y), and 134 (67.3%) were male. The self-inserted group had a mean age of 50.6 years (range, 12–85y), and 85 (97.7%) were male. The iatrogenic group had a mean age of 56.5 years (range, 51–63y), and 2 (40%) were male. The proportion of male patients in the self-inserted group was significantly higher compared to the swallowed RFB group ($t = 31.114$, $p = 0.000$; Table 1.)

Table 1
Demographics of three RFB groups

	Swallowed	Self-inserted	Iatrogenic	Totals
Cases	199 (68.4%)	87 (29.9%)	5 (1.7%)	291
Age	55.2 ± 15.9	50.6 ± 14.8	56.6 ± 5.5	53.8 ± 15.5
Gender (Male/Female)	134/65 (67.3%/32.7%)	85/2 (97.7%/2.3%)	2/3 (40%/60%)	225/66 (77.3%/22.7%)

We further classified the RFB of the three groups. In the swallowed group, jujube nuclei were the most common objects (167, 83.9%). Other swallowed foreign objects were as follows (n, %): fishbone (14, 7.0%), bone (9, 4.5%), toothpick (4, 2.0%), and others (shell, denture, food package, 5 cases, 2.5%). In the self-inserted group, the classification was as follows (n, %): bottle (17, 19.5%), hard stick or tube (15, 17.2%), sausage or soft sausage-shaped object (12, 13.8%), masturbator (12, 13.8%), pen (7, 8.0%), self-use medical device or component (6, 6.9%), sphere (6, 6.9%), bottle cap (5, 5.7%), cup (5, 5.7%) and others (2, 2.3%). The iatrogenic RFB group consisted of 4 cases (80%) of PPH staples and 1 case (20%) of a uterine contraceptive device (Table 2).

Table 2
Categories of RFB

	Swallowed		Self-inserted		Iatrogenic	
	n = 199		n = 87		n = 5	
Category of RFB n (%)	Jujube nuclei	167 (83.9%)	Bottle	17 (19.5%)	PPH staples	4 (80%)
	Fishbone	14 (7.0%)	Stick or tube (hard)	15 (17.2%)	Intrauterine device	1 (20%)
	Bone	9 (4.5%)	Sausage or sausage type(soft)	12 (13.8%)		
	Toothpick	4 (2.0%)	Masturbator	12 (13.8%)		
	Other (shell, denture, food package)	5 (2.5%)	Pen	7 (8.0%)		
			Self-use medical device or component	6 (6.9%)		
			Sphere	6 (6.9%)		
			Bottle cap	5 (5.7%)		
			Cup	5 (5.7%)		
			Other	2 (2.3%)		

The anorectal injuries and pathological changes caused by the RFB and its location were classified according to the description in the medical records. In the swallowed group, the most common anorectal injuries and pathological changes were the following (n cases, %): penetration of the mucosa (75, 37.7%), perianal or submucosal abscess (27, 13.6%), and penetration of the anal canal (18, 9.04%). In addition, there were four important but less common injuries or pathological changes (n cases, %): rectal mucosal rupture (6, 3.0%), congestion and edema of rectal mucosa (3, 1.5%), internal hemorrhoid bleeding (2, 1.0%), and rectal bleeding (1, 0.5%). Notably, 2 patients suffered from perianal abscess 5 and 7 days following RFB removal. There were 67 cases in this group that had no injuries or pathological changes described in the medical records. In the self-inserted group, we found that most cases did not have rectal or anal injuries, with 64(73.6%)of the 87 cases having an intact rectum. However, 8 cases (9.2%) had rectal mucosal ulcers and bleeding, 7 (8%) had rectal lacerations, 4(4.6%)had congestion and edema of the rectal mucosa, and there was 1 case each (1.1%) of skin laceration of the anal canal, internal

hemorrhoid bleeding, rectal mucosal necrosis, and perianal abscess. In the iatrogenic group, 3 cases (60%) had rectal mucosal ulcers and bleeding, and the other 2 cases (40%) had inflammation of the rectal mucosa (Table 3).

The location of the rectal foreign body was confirmed by digital rectal examination, X-ray, and anoscopy. Approximately one-half of the swallowed RFB were located at the junction of the rectum and anal canal (100 cases, 50.3%). In 27 swallowed cases (13.6%), the foreign body had penetrated into the rectal mucosa or skin of the anal canal. In 11 cases (5.6%), the RFB were movable within the rectal cavity, and in 2 cases (1%), the RFB had entered an abscess cavity. In the self-inserted group, the RFB of 54 cases (62.1%) were in the rectal cavity. The RFB of the remaining 33 cases (37.9%) were in both the rectum and sigmoid colon. In 4 cases (80%) of the iatrogenic RFB group, hemorrhoidectomy PPH staples were left in the rectal wall. In the other iatrogenic case (20%), CT confirmed that an intrauterine device had punctured into the rectum through its anterior wall (Table 3).

Table 3
Anorectal injuries and pathological changes

	Swallowed (199)		Self-inserted (87)		Iatrogenic (5)	
Anorectal injuries and pathological changes	penetration into mucosa	75 (37.7%)	rectal mucosal ulcer and bleeding	8 (9.2%)	rectal mucosal ulcer and bleeding	3 (60%)
	perianal and submucosal abscess	27 (13.6%)	rectal laceration	7 (8.0%)	inflammation rectal mucosa	2 (40%)
	penetration into anal canal	18 (9.04%)	congestion and edema of rectal mucosa	4 (4.6%)		
	small rectal mucosa rupture	6 (3.0%)	skin laceration of anal canal	1 (1.1%)		
	congestion, edema of rectal mucosa	3 (1.5%)	internal hemorrhoid bleeding	1 (1.1%)		
	internal hemorrhoid bleeding	2 (1.0%)	rectal mucosal necrosis	1 (1.1%)		
	rectal bleeding	1 (0.5%)	perianal abscess	1 (1.1%)		
	delayed perianal abscess	2 (1.0%)				
	Total	132 (66.3%)	Total	23 (26.4%)	Total	5 (100%)
no injuries or pathological changes, not described	67 (33.7%)	no injuries or pathological changes, not described	64 (73.6%)			
Location of RFB	Stuck, junction of rectal and anal canal	100 (50.3%)	in rectal cavity	54 (62.1%)	in rectal wall	4 (80%)
	penetration rectal mucosa	27 (13.6%)	in lumen of sigmoid colon	33 (37.9%)	penetrated rectum	1 (20%)
	penetration skin of anal canal	27 (13.6%)				

	Swallowed (199)	Self-inserted (87)	Iatrogenic (5)
	free in rectal cavity	11 (5.6%)	
	in abscess cavity	2 (1%)	
	not described	32 (16.1%)	

In the swallowed group, 187 (187/199, 94%) patients had resolution by the transanal surgical procedure; in 10 (5%) patients the RFB was expelled prior to the planned procedure. All the transanal surgical procedures were successful in this group. Of the 187 patients treated by the transanal surgical procedure, the anesthetic techniques used were (n cases, %): sacral, 144 (77%); local, 39 (20.9%); general, 3 (1.6%); and no anesthesia in 1 (0.5%). In conjunction with RFB extraction in this group, 27 patients underwent perianal abscess incision and drainage, 16 patients underwent debridement, and 6 patients underwent wound suture.

In the self-inserted group, 82 patients underwent the transanal surgical procedure with successful removal in 74 (90.2%), whereas in 8 (9.8%) the operation was unsuccessful. The anesthetic techniques used in this group were (n cases, %): sacral, 75 (91.5%); local, 5 (6.1%); and no anesthesia in 2 (2.4%). In conjunction with extraction of the RFB, 4 (4.9%) required suture of rectal injuries, 3 (3.7%) necessitated partial sphincterotomy due to the excessive foreign body size, and 1 (1.2%) underwent perianal abscess incision and drainage. In the iatrogenic group, 3 (75%) had resolution with the transanal procedure under sacral anesthesia, whereas 1 (25%) failed (Table 4).

Table 4
Procedures and outcomes

	Swallowed (199)		Self-inserted (87)		Iatrogenic (5)	
Outcomes	Transanal removal	187 (94%)	Transanal removal	74 (85.1%)	Transanal removal	3 (60%)
	Spontaneous discharge	10 (5%)	Failed transanal removal	8 (9.2%)	Failed transanal removal	1 (20%)
	Untreated, left to pass	2 (1%)	Transfer to other hospital	2 (2.3%)	Transfer to other hospital	1 (20%)
			Untreated, left to pass	3 (3.4%)		
Success, transanal procedure	187/187	100%	74/82	90.2%	3/4	75%
Anesthesia Method	General anesthesia	3 (1.6%)	Sacral anesthesia	75 (91.5%)	Sacral anesthesia	4 (100%)
	Sacral anesthesia	144 (77%)	Local anesthesia	5 (6.1%)		
	Local anesthesia	39 (20.9%)	Not anesthetized	2 (2.4%)		
	Not anesthetized	1 (0.5%)				
Other surgical procedures	Abscess incision and drainage	27	Rectal injury suture	4		
	Debridement	16	Partially severed sphincter	3		
	Suture to stop bleeding	6	Perianal abscess incision and drainage	1		

Discussion

Although RFB cases are uncommon anorectal emergencies, the frequency has been increasing in recent years [1, 2]. Patients with RFB can suffer various anorectal injuries and their treatment may be complicated and difficult due to the type, size, and texture of the foreign body. In previously published literature, most authors had appropriately focused on the surgical treatment of self-inserted RFB and associated

anorectal injuries. The demographics of these most commonly encountered RFB patients has been well described in Asian^[3], European^[4] and USA populations^[5]. However, in addition to these patients, RFB can be caused from oral swallowing and iatrogenic implantation. There are few reports on RFB from the latter two sources. In the present study, patients with RFB that originated by swallowing were the most common, so this type of RFB also required attention.

Among the 291 cases included in this study, the proportions of swallowed, self-inserted and iatrogenic RFB were 68.4%, 29.9%, and 1.7%, respectively. Male patients accounted for a higher proportion in both the swallowed (male/female, 134/65, 68.4%) and the self-inserted groups (male/female, 85/2, 97.7%), but the self-inserted group had a markedly higher proportion of males compared to the swallowed RFB group ($t = 31.114, p = 0.000$). Most patients with swallowed RFBs complained of anal pain and bleeding, rather than directly mentioning a rectal foreign body at the time of presentation, similar to patients with iatrogenic RFB. This was quite different from the patients with self-inserted RFBs. Through review of the medical records, we found that although the patient could not provide a history specifically related to swallowing a foreign body, digital examination could confirm a RFB consistent with a mistakenly swallowed source. Most published RFB series report the frequency of self-inserted RFB to range from 78–100% of all cases^[6, 7, 8]. In our study, most patients did acknowledge self-insertion of the foreign body, but they avoided further discussion. As part of medical record review, we found 2 patients with repeated hospitalizations for self-inserted RFB, and clinicians also reaffirmed the persistent behavior of self-inserted RFB, even with a prior history of surgical treatment. In the iatrogenic RFB group, 4 patients with PPH staples were diagnosed by the digital examination together with the history of PPH surgery. However, the case with the intrauterine device that had penetrated the uterine wall and into the anterior wall of the rectum was unexpected until the CT scan was obtained. In summary, it is easier to diagnose patients with rectal foreign bodies swallowed or inserted by themselves. Digital rectal examination supplemented by x-rays and anoscopy as appropriate are usually definitive. Despite abdominal X-ray having been recommended as necessary examinations in previous reports, especially to identify or exclude intraabdominal free air, we rarely performed abdominal plain radiographs in RFB patients if they had no signs of peritonitis, especially those with confirmed small RFB such as jujube nuclei retained in the rectum.^[9, 10, 11, 12] X-ray and CT were used in patients with large RFBs, to confirm the size and depth of the foreign body in the rectum. Remarkably, in only one patient was the source of the foreign body unknown after completing the medical history and digital examination, the contraceptive device originating from the uterus that penetrated the anterior wall of the rectum. Intrarectal ultrasound was not utilized because it might cause foreign bodies to move deeper or worsen a penetrating injury.

In this study, we analyzed the rectal injuries in relation to the cause of the RFB: swallowed, self-inserted and iatrogenic. The swallowed RFB were mostly small but with a somewhat sharp shape, such as jujube nuclei, fish bones, and toothpicks. The anorectal injuries caused by the sharp foreign bodies were also common, but most of the injuries were minor, including penetration of the mucosa (37.7%) and anal canal (9.04%). The incidence of small rectal mucosal rupture, congestion and edema, internal hemorrhoid and rectal bleeding were low: 3.0%, 1.5%, 1.0%, and 0.5%, respectively. However, there were 27 patients

with perianal or submucosal abscesses and 2 patients with a delayed perianal abscess. The incidence of anorectal injury caused by self-inserted RFB was significantly lower than that of swallowed foreign bodies, but the degree of injury was significantly more serious. Patients in the self-inserted group had more serious rectal mucosal ulcers and bleeding (9.2%), rectal laceration (8%), skin laceration of the anal canal (1.1%), and rectal mucosal necrosis (1.1%). The location of an RFB is of paramount concern to the physician because it can suggest the risk of injury and the difficulty of the treatment prior to the examination. In general, swallowed foreign bodies were located mainly in the distal rectum or anal canal, were freely movable, with injuries limited to limited mucosal penetrations. In the self-inserted group, approximately one third of RFBs were in the lumen of the sigmoid colon. Fortunately, no penetration of the intestinal wall was found in either group. In contrast, the location of the iatrogenic RFBs were within or penetrating the rectal wall, due specifically to the underlying cause, but made treatment difficult.

The three groups of RFB patients had additional significant differences in treatment outcomes. The swallowed RFBs seemed to be relatively easier to remove due to the size, shape, location, and degree of damage to the rectum and anus. There were about ten percent of patients with swallowed RFBs, who expelled the RFBs themselves prior to any surgical procedure. The success rate of the transanal surgical procedure for the swallowed RFBs was 100%. In the other two groups of RFB patients, we did not find any occurrence of spontaneous expulsion of foreign bodies and the success rates of transanal manipulation were 90.2% and 75%, respectively. In addition to removal of the RFB in the swallowed and self-inserted patients, there was need for adjunctive procedures such as abscess incision and drainage, debridement and suture to stop bleeding. In a small number of patients with self-inserted RFB we performed suture repair of the rectum and a partial severance of the sphincter.

Conclusion

In conclusion, this study demonstrated the epidemiological characteristics, anorectal injuries, and results of transanal foreign body removal in a single center of patients with RFB. Men were more likely than women to have swallowed RFBs and self-inserted RFBs. No serious damage to the rectum or anus was found in cases of swallowed RFB. Moreover, all surgical operations in the swallowed group to remove foreign bodies via the anus were successful. In contrast, rectal injury was more severe in patients with self-inserted RFB, such as rectal laceration, rectal mucosal ulcer, and bleeding. Moreover, the transanal removal operation in patients with self-inserted RFB had a failure rate of nearly 10%. Thick, long, hard foreign bodies did present a great challenge to the operator. Therefore, if necessary, patients with foreign bodies may need to be promptly referred for transabdominal removal.

Declarations

Author contributions:

Yong Zhang wrote the manuscript; Yi Han and Huimian Xu gave great help and methodological guidance in the execution of the study; Deyu Chen, Hongjian Gao, Hexue Yuan and Xiandong Zeng prepared figures 1-3. All authors reviewed the manuscript.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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