Retained Upper Genitourinary Gossypiboma Can Mimic Renal Neoplasms. A Review Of The Literature

D Hennessey, A Thomas, T Lynch, R Casey

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Abstract

Introduction: Retained iatrogenic foreign bodies (RIFB) are uncommon, preventable errors that carry serious professional and medico-legal consequences. Urological surgery is at increased risk of RIFB; due to the increasing complexity of endoscopic and minimally invasive procedures. Aim: We analysed all reported cases of RIFB in world literature and have compiled the first comprehensive review on the management of upper tract RIFB. Methods: A literature review using medical search engines was performed. Publications reporting non iatrogenic foreign bodies were excluded from the review. Retained foreign bodies are referred to by their name, except for retained surgical swabs which are referred to as gossypiboma. Data is presented as median (interquartile range). Results: Data was obtained and analysed on 40 cases. 37 cases (92.5%) were related to previous urological surgery; 14 (35%) - percutaneous renal surgery, 11 (30%) - open stone surgery (30%), 5 (13.5%) - urinary diversion, 5 (13.5%) - ureteroscopic surgery, 3 (8%) pyeloplasty surgery (8%). 7 (17.5%) patients with upper tract RIFB represented with symptomatic renal masses, 85% underwent a radical nephrectomy. Gossypiboma accounted for 85.8% of these renal lesions. Median interval between initial surgery and representation is 60 months (12 – 216). Of these patients 5 (71.4%) underwent a previous pyelolithotomy or nephrolithotomy. Conclusion: RIFB are preventable errors and measures should be put in place to reduce the incidence. When confronted with a patient who has renal mass and a history of previous surgery close to the area. One must consider the possibility of a gossypiboma.

INTRODUCTION

An iatrogenic retained foreign body (IRFB) is any object left unintentionally in a patient following any operation, procedure, treatment or investigation. The actual prevalence of iatrogenic foreign bodies is under reported to potential litigation, legal claims and critical media coverage [1]. Nevertheless urological surgery is estimated to be the third most common cause of IRFB [2]. This figure is likely to increase in the future, due to the development and sophistication of endoscopic minimally invasive procedures, and the increasing use of ureteric stent in urological practice [3].

Despite the clinical importance of retained urological foreign bodies, to date there has been no comprehensive review of iatrogenic upper tract and renal foreign bodies. In addition, there is a paucity of information regarding the origin, diagnosis, management and surgical approach of iatrogenic foreign affecting the genitourinary tract in the literature.

In this review we examine over 40 individual cases of iatrogenic renal and upper genitourinary tract foreign bodies. We analysed the origin, diagnosis, and management of these foreign bodies and have categorised the results into; (1) original procedure associated with the retained foreign material; (2) type of material and (3) the eventual management, in order to create a resource for future reference and research into this topic.

METHODS

A comprehensive literature inquiry using the following medical search engines was performed: Google™, Medline, Embase and PubMed. The search included a combination of the following terms: (a) retained surgical foreign body; (b) iatrogenic foreign body; (c) renal foreign body; (d) gossypiboma; (e) management retained surgical foreign bodies. Search results were assessed for their overall relevance to this review. Definitions, general overview and management options were extracted from the relevant medical literature.

Over 40 individual cases and 19 different types of IRFB were obtained from world literature, dating from 1951 to 2009. In this study, reports included were those who

underwent operations on the upper genitourinary tract, adjacent anatomical areas and had documented evidence of retained foreign bodies. Patients who underwent ureteric or vesical surgery and had documented evidence of retained foreign bodies were omitted from this study. Publications reporting non iatrogenic foreign bodies or any object inserted by the patient were excluded from the review.

Data obtained included the original procedure that resulted in the retained material, type of foreign body, number of cases, associated stone formation, if the foreign material mimicked a neoplasm on imaging and the management approach to treat the foreign body. In this review all retained foreign bodies are referred to by their technical name, except for retained surgical sponges and swabs which we refer to as gossypiboma, a term derived from the Latin gossypium (cotton) and the Swahili boma (place of concealment).

RESULTS

INCIDENCE OF FOREIGN BODY ACCORDING TO TYPE OF OPERATION

Data was obtained and analyzed on 40 individual cases of iatrogenic upper tract foreign body. The majority of retained upper tract foreign bodies (92.5%) were related to a previous urological surgery. The remaining cases of retained material were secondary to previous colorectal, orthopaedic and radiological procedures. Table 1 demonstrates the incidence of retained iatrogenic upper tract foreign bodies and the surgical procedure responsible. The placement of a percutaneous nephrostomy (PCN) and associated percutaneous procedures, account for 35% of all upper tract retained foreign material. Open stone and malignancy surgery – pyelolithotomy, nephrolithotomy and nephrectomy account for 30% of foreign bodies. Cystectomy and continent urinary diversion surgery and endo/ureteroscopic procedures, account for 13.5% of cases. Laparoscopic and open pyeloplasty surgery accounts 8% of upper tract retained foreign material. Colorectal surgery, spinal surgery and radiological interventions account for 7.5% of retained upper tract foreign material.

FOREIGN BODIES FOLLOWING PERCUTANEOUS NEPHROSTOMY INSERTION

PCN placement or percutaneous procedures carried out through the nephrostomy tube account for the majority of retained renal foreign bodies. Retained material includes; nephrostomy threads that were inadequately removed from a patient, resulting in stone formation and renal colic. This patient underwent a percutaneous nephrolithotomy (PCNL), were it noted that the threads were encompassed in stone [4] (Table 2). Nephrostomy catheters and Malecot nephrostomy tubes have also been retained following PCNL [5 6]. A retained Malecot nephrostomy tube, was removed endoscopically, however retained nephrostomy catheters appear be more difficult to remove, requiring percutaneous removal in all cases reported. A portion of a plastic drape bag was also retained following a PCNL. The plastic was inadvertently introduced into the renal pelvis during the procedure, and was later removed by endoscopically [7] (Table 3).

The inadvertent catheterization of the renal vein by a PCN tube resulted in the intra-vascular migration of tube. Two cases report independent nephrostomy tube migration into the inferior vena cava, while a third cases reports the presence of a nephrostomy tube in the right atrium [8 9]. Successful removal of the foreign bodies was achieved by interventional radiology. The final case of a foreign body related to PCNL is that of an Amplatz sheath that inadvertently migrated out of the renal pelvis into the peritoneal cavity. This necessitated a laparoscopic approach for removal [10].

FOREIGN BODIES RETAINED FOLLOWING OPEN STONE AND UPPER TRACT CANCER SURGERY

Open stone surgery accounts for approximately one third of all iatrogenic renal foreign bodies. The most common object retained is suture material or gossypiboma (Table 1). Silk sutures are the most commonly reported material retained. Polyglactin (vicryl); an absorbable suture was the second most common retained suture. Retained sutures can act as a nidus for stone formation, and in the majority of cases, patients presented years after the initial procedure with renal colic [11 12 13]. Endoscopic destruction of the stone has been reported to be successful [11 12], however severe stone burden may necessitate open surgery [13] (Table 2).

One patient with retained suture material following a pyelolithotomy represented with haematuria 8 years after the initial procedure. A CT Urogram demonstrated a renal mass; and the patient underwent a laparoscopic nephrectomy, histological analysis demonstrated no malignancy and only granuloma formation around retained suture material [14] (Table 4). Similarly gossypiboma can incite an inflammatory reaction similar to that of the above case, which has the appearance of a renal or retroperitoneal tumour on imaging [15]. There are 7 reports of gossypiboma following open renal surgery, in every case the gossypiboma was misdiagnosed

preoperatively as a renal or retroperitoneal malignancy. Subsequently all of these patients underwent major surgery and 85% of these patients had a radical nephrectomy [15 16 17 18 19 20] (Table 4).

FOREIGN BODIES FOLLOWING ENDO/URETEROSCOPIC PROCEDURES.

Endoscopic surgery for urolithiasis has resulted in five cases of retained renal foreign body. It is ironic that instruments used to treat stone disease lead to further stone formation in 80% of cases highlighted in Table 2. Retained endoscopic equipment includes, 2 cases of retained laser fiber wire, 2 cases of fractured guide wires and 1 case of a piece of ureterorenoscope that broke off intra-operatively [21 22 23 24] (Table 1). The majority of cases were managed endoscopically [22] , however a fractured guide wire [23] and the part of the ureterorenoscope needed PCN removal due to associated stone burden [24] (Table 2).

FOREIGN BODIES RETAINED FOLLOWING URINARY DIVERSION SURGERY

Iatrogenic renal foreign bodies after an ileal conduit or urinary diversion are related to gastrointestinal anastomosis (GIA) clips refluxing into the renal collecting system. The presence of a GIA clip in the collecting system again acts a nidus for stone formation has been frequently reported [25 26 27 28 29]. Ureterorenoscopic treatment of the stone and the refluxed staple has been reported [25], however it is more likely that a percutaneous approach would be favored especially in the setting of heavy stone burden (Table 2).

FOREIGN BODIES RETAINED FOLLOWING PYELOPLASTY PROCEDURES

Retained foreign bodies post open or laparoscopic pyeloplasty are infrequent. Nevertheless retained material reported includes a Hem-o-lok clip, surgical clip and suture material (Table 1). The Hem-o-lock clip migrated into the collecting system leading to stone formation. Endoscopic management was unsuccessful and the patient required PCN for removal of the clip and the associated stone burden [30]. In addition, intra-renal clips post pyeloplasty have required PCNL for treatment [31]. Retained polyglactin (vicryl) sutures and associated calculi were successfully removed by an endoscopic procedure [32] (Table 2).

FOREIGN BODIES RETAINED FOLLOWING OTHER PROCEDURES

Retained suture material has also been reported following a subtotal colectomy, where the suture migrated into the collecting system. In this case, the retained suture lead to stone formation, this calculus was not amenable to endoscopic removal and needed a PCNL for removal [33] (Table 2). The erosion of radiological embolisation coil from the renal artery into the renal pelvis has also been reported. The patient initially underwent selective embolisation following a renal haemorrhage related to PCN insertion. However, several years later the patient presented with flank pain and was diagnosed with an intra-renal embolisation coil and associated stone formation. This was successfully managed non operatively, and the patient passed the foreign body spontaneously [34]. A spinal procedure has also resulted in final and most unusual case of renal foreign body. The patient in question underwent a procedure in which a myelography needle was inserted in their spine. The needle was lost during the procedure. Over the course of several years the progress of the needle was monitored by serial imaging, eventually the needle eroded into the renal pelvis. The patient did not require operative management [35] (Table 3).

Figure 1

Table 1: Incidence of upper tract iatrogenic foreign bodies and original procedures

Original Procedure	Foreign Body	No. of Cases	Reference
Percutaneous nephrostomy and stone procedures	Nephrostomy threads	2	4
	Nephrostomy tubes	3	5
	Malecot nephrostomy	3	6
	Part of plastic drape	1	7
	Amplatz sheath	1	10
	Intra-vascular tube	3	8, 9
Open stone and upper tract cancer surgery	Suture	4	11, 12, 13, 14
	Gossibyopma	7	15, 16, 17, 18, 19, 20,
Endo/Ureteroscopic procedures	Laser wire	2	21,
	Inner core of guide wire	1	22
	Guide wire	1	23
	Catheter fragment	1	24
Ileal conduit/Urinary diversion	Refluxed staples	5	25, 26, 27, 28, 29
Open or laparoscopic surgery for PUJ obstruction	Hem-o-lok clips	1	30
	Surgical clips	1	31
	Vicryl suture	1	32
Non Urological Surgery	Suture material	1	33
	Embolisation coil	1	34
	Myelography needle	1	35

Tabulated summary of all renal iatrogenic foreign bodies according to original procedure responsible, type of foreign body, number of reported cases.

PCN, Percutaneous nephrostomy; PCNL, Percutaneous nephrolithotomy

Figure 2

Table 2: Management of upper tract foreign bodies that developed associated stone formation

Original Procedure	Foreign Body	No. of Cases	Management	Reference
PCN/PCNL	Nephrostomy threads	1	PCN and removal	4
Pyelolithotomy/	Suture material	3	Endoscopic (1), PCN and removal (1)	11, 12, 13
Nephrolithotomy			Open (1)	
Ureteroscopic	Laser wire	2	Endoscopic (2)	21,
procedures	Inner core of guide wire	1	Endoscopic	22
	Catheter fragment	1	Endoscopic	24
Ileal conduit/diversion	Refluxed staples	5	Endoscopic (1)	25, 26, 27, 28, 29
Pyeloplasty	Hem-o-lok clips	1	PCN and removal	30
	Surgical clips	1	PCN and removal	31
	Vicryl suture	1	Endoscopic	32
Other	Suture material	1	PCN and removal	33

PCN, Percutaneous nephrostomy; PCNL, Percutaneous nephrolithotomy

Tabulated summary of cases series reporting management of retained encrusted upper tract foreign bodies, with the number of individual cases and management approaches.

PCN, Percutaneous nephrostomy; PCNL, Percutaneous nephrolithotomy

Figure 3

Table 3: Management of additional upper tract foreign bodies

Original Procedure	Foreign Body	No. of Cases	Management	Reference
PCN/PCNL	Nephrostomy threads	1	PCN and removal	4
	Nephrostomy tubes	3	PCN and removal(3)	5
	Malecot nephrostomy	3	Endoscopic (3)	6
	Part of plastic drape	1	Ureteroscopic	7
	Amplatz sheath	1	Laparoscopy	10
	Intra-vascular tube (3)	3	Radiological	8, 9
Ureteroscopic procedures	Guide wire	1	PCN and removal	23
Non Urological	Embolisation coil	1	Endoscopic	34
	Myelography needle	1	Non operative	35

PCN, Percutaneous nephrostomy; PCNL, Percutaneous nephrolithotomy

Tabulated summary of cases series reporting management of retained upper tract foreign bodies that did not have stone encrustation, with the number of individual cases and management approaches.

PCN, Percutaneous nephrostomy; PCNL, Percutaneous nephrolithotomy

Figure 4

Table 4: Management of upper tract foreign bodies that were mistaken for a malignancy and outcome

Original Procedure	Foreign Body	Presentation	Interval (Years)	Appearance (Imaging)	Outcome	Reference
Pyelolithotomy	Suture	Flank pain/Haematuria	8	Mass with central necrosis	Lap Radical Nephrectomy	14
Open biopsy	Gossibyopma	Abnormal Imaging	1	Mass containing calcifications.	Open exploration and removal	15
Pyelolithotomy	Gossibyopma	Flank pain	18	Para-renal tumor	Nephrectomy	16
Nephrolithotomy	Gossibyopma	Flank pain	5	Mass suspicious for malignancy	Nephrectomy	17
Nephrolithotomy	Gossibyopma	Flank pain	38	Exopyhtic hypercalcified mass	Nephrectomy	18
Open partial nephrectomy	Gossibyopma	Abnormal Imaging	1	Haemorrhagic neoplasm	Nephrectomy	19
Nephrolithotomy	Gossibyopma	Abnormal Imaging	5	Solid renal mass	Nephrectomy	20

PCN, Percutaneous nephrostomy; PCNL, Percutaneous nephrolithotomy

Summary of cases series reporting management of retained upper tract foreign bodies that were mistaken for renal or para-renal neoplasms. Results tabulated according to original procedure responsible, type of foreign body, presentation, interval to presentation appearance on radiological imaging and outcome.

DISCUSSION

The presence of iatrogenic foreign bodies in the upper genitourinary tract presents a dilemma and challenge for any urologist. This is not only from the medico-legal implications that are associated with retained material but also from a management point of view. While most upper tract foreign bodies are amenable to endoscopic removal, factors such as concomitant urolithiasis may necessitate a multi-modal or multi procedure approach. Open surgery may be necessary, when minimally invasive approaches are unsuccessful or contraindicated especially in the setting of heavy stone burden. In this review, we noted that 42.5% of retained renal foreign bodies had associated stone formation, which were managed in 46% of cases endoscopically, 33% of cases by PCN and in the remaining cases by open removal.

Interestingly 20% of renal iatrogenic foreign bodies mimicked the appearance of a renal or para-renal malignancy on preoperative radiological imaging [16 17 20]. This included 7 cases of gossypiboma and 1 case of retained suture material. All of these cases were related to previous upper tract surgery – pyelolithotomy, nephrolithotomy and a partial nephrectomy. The mean time to presentation is 10.5 years, while the median is 5 years, the longest duration between presentation and original procedure was 38 years and the shortest was 1 year. Over 62% of these patients presented with symptoms, usually flank pain or haematuria.

In 100% of cases, pre-operative imaging demonstrated a renal or para-renal mass that was highly suspicious for a malignancy. In 85% of cases the patient underwent an unnecessary nephrectomy (Table 4). Accordingly we have concluded that, when confronted with a patient who has renal or retroperitoneal mass on diagnostic imaging and a history of previous surgery close to the area, particularly open stone surgery such as a nephrolithotomy. One must consider the possibility of a gossypiboma, and retained foreign material should always be suspected, irrespective of the time elapsed between original surgery and presentation. To make this diagnosis a high index of suspicion is needed especially since CT and MRI cannot unequivocally distinguish a retained foreign body from other urologic diseases such as renal cysts, abscess or malignancy.

In any case, iatrogenic foreign bodies are preventable errors and measures should be put in place to reduce the incidence. Efforts should be directed towards effective clinical surveillance and checking systems that prevent inadvertent iatrogenic mistakes such as these. Ureterorenoscopes, ureteroscopes and cystoscopes should be checked post procedure to ensure that all parts of the apparatus are present. During open surgical procedures, closure of the wound should not commence until all swabs are accounted for. Further to these recommendations we also advise that all nephrostomy tubes are checked along with all urinary catheters post removal to ensure that are intact to rule out the possibility of retained material.

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Author Information

Derek B. Hennessey, MD MRCSI
Department of Urological Surgery, St. James Hospital

Arun Z. Thomas, MCh MRCSI
Department of Urological Surgery, St. James Hospital

Thomas H. Lynch, MCh FRCSI
Department of Urological Surgery, St. James Hospital

Rowan G. Casey, MD FRCSI
Department of Urological Surgery, St. James Hospital