

Medical Case Report

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Intractable bleeding: the role of embolization in a resource-limited country

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Abstract

Transarterial catheter embolization is novel in Ghana, even though it has been practiced over three decades in certain parts of the world. The procedure is safer with the advent of new catheter techniques and embolic agents which place interventional radiology at the forefront of the treatment of bleeding due to myriad of indications. It is fast, safe, and minimally invasive relative to open surgery, especially when other conventional minimally invasive procedures such as endoscopic banding and sclerotherapy fail. This paper presents two cases involving pre- and post-embolization digital subtraction angiogram (DSA) of gastroduodenal artery and bilateral iliac arteries. Findings of DSA of the gastroduodenal artery and bilateral iliac arteries showed florid extravasation and extensive neovascularity. Post embolization DSA showed absent extravasation and near total devascularization. The inclusion of embolization to the management protocols of upper gastrointestinal bleeding and intractable haematuria is recommended.

Keywords: embolization; haematuria; melaena; haemoptysisOpen
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INTRODUCTION

Percutaneous embolotherapy is the application of agents and materials to achieve vascular occlusion. It is a minimally invasive procedure where guidewires and catheters are used to deliver these embolic agents [1]. Pre-embolization arteriograms allow for intra-procedural confirmation of vascular anatomy as well as the super-selective catheterization of tumor-feeding arteries [2]. After the embolic agent is deployed, postembolization arteriography allows for immediate confirmation of tumor devascularization. Indications for embolization may include bleeding peptic ulcer, post-partum hemorrhage, intractable haematuria and hemoptysis [3]. Embolisation may be performed to complement surgery or as the first choice of treatment [3]. The type of agent used depends on the nature of the vessel, the clinical state of the patient, how long the occlusion is desired and the need to preserve tissue viability post embolization [2]. In a clinically stable patient, superselective permanent embolization is performed. Temporal embolization is employed in patients who are clinically unstable such as polytrauma patient with

hypotension [2]. In Ghana and many resource-deprived countries, percutaneous embolotherapy services are not readily available. Where they are available, they are seldom affordable for most patients. Worse still, the paucity of trained manpower in therapeutic procedures and the high cost of equipment and their accessories may have further limited the use of therapeutic embolization in the treatment of intractable bleeding in Ghana. In a resource-limited setting, most patients with intractable bleeding receive frequent blood transfusions, which excessively burden the patient with cost and potential complications of transfusions [4,5]. Although a less-resourced country may not have sophisticated equipments to handle intractable bleeding, managing intractable bleeding must be guided by what is available at a given location, financial strength of patient, safety and the quality of life. The economic impact is worsened in countries with less efficient health insurance policy to support patients. Compared to the traditional way of managing intractable bleeding [4,5], the application of percutaneous embolotherapy is not only effective but a safe and simple procedure. Currently, only two health facilities in Ghana are well-equipped to offer therapeutic embolization making it difficult for most patient to access. The therapeutic embolization is only available at Euracare Advanced Diagnostic and Heart Centre and Korle Bu

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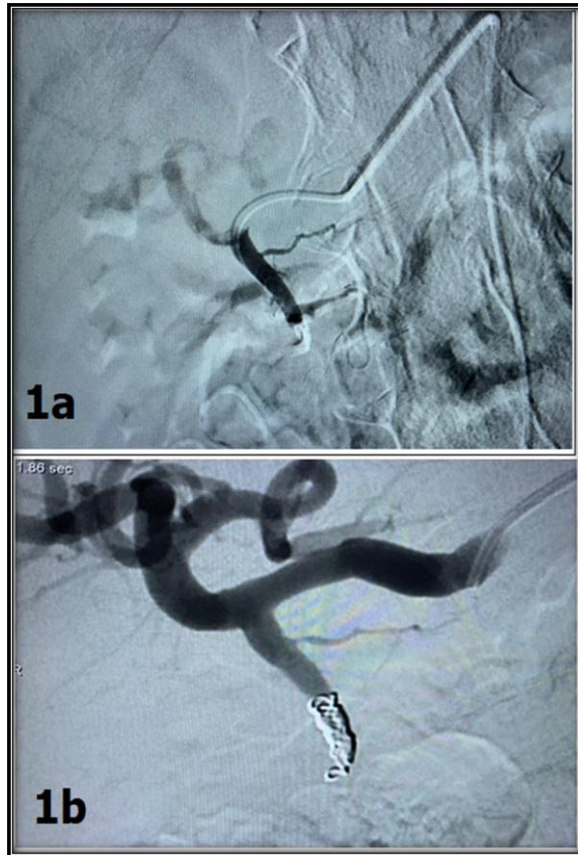


Plate 1: Digital subtraction angiogram (DSA) image with C2 cobra catheter (1a) and post embolization DSA image with catheter (1b) in the common hepatic artery.

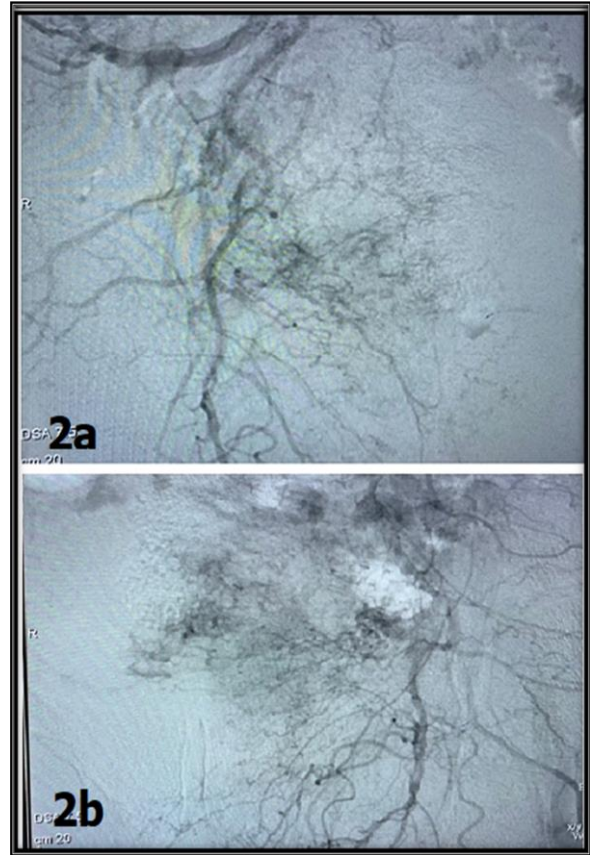


Plate 2: Digital subtraction angiogram image of the (2a) right internal iliac artery and (2b) left internal iliac artery. Both images show extensive tumour blush in the vesical artery territories pre-embolization.

Teaching Hospital. This study presents two cases of intractable bleeding due to bleeding peptic ulcer and locally advanced urinary bladder transitional cell carcinoma who together received more than 70 units of blood, prior to successful embolotherapy procedures.

CASE 1

A 70-yr. old male who presented with 3 mos history of melaena and past medical history of duodenitis and hypertension. He had previously received triple therapy and endoscopic sclerotherapy to control the bleeding. He had no history of bleeding disorder or liver disease. Over 16 wk, his haemoglobin levels fluctuated between 3.4-10 g/dL and had received 50 units of packed red cells and whole blood within this period. His platelet count, liver function test and kidney function test were within normal range. The patient was in Thrombo-Embolous Deterrent (TED) compression stockings during each admission to forestall deep vein thrombosis. The quality of life was affected as he was unable to do simple daily activities by himself. The digital subtraction angiogram (DSA) alongside C2 cobra catheter in the common hepatic artery and microcatheter in the

gastroduodenal artery showed florid extravasation (Image 1a of Plate 1). Cessation of bleeding was immediately demonstrated by post embolization DSA. No bleeding episode was reported during a 12-wk follow up post embolization (Image 1b of Plate 1). Current hemoglobin level is 12.4 g/dL without post embolization transfusion. Patient reported improved quality of life as he required less help in doing simple daily tasks.

CASE 2

An 85-yr. old hypertensive male with no known history of bleeding disorder or liver disease presented with frank haematuria due to recurrent synchronous transitional cell carcinoma of the right kidney and right lateral wall of the urinary bladder. Initial CT scan showed 3.5 x 3.7 x 2.4 cm mass in the renal pelvis with severe hydronephrosis and polypoid urinary bladder mass. There was no extravescical extension. The prostate gland was enlarged and measured 109 g. The patient had a history of two previous surgeries, six months apart, to remove bladder mass and to control the haematuria. With post-surgical worsening haematuria, he received four cycles of pelvic radiation to control the



Plate 3: Digital Subtraction Angiogram image of the (3a) right internal iliac artery and (3b) left internal iliac artery. Both images show marked reduction in tumour blush

haematuria. His laboratory parameters included haemoglobin (7.0 g/dL), platelet (197 n/L), estimated glomerular filtration rate eGFR (69 mL/min), and Urea (4.4 mmol/L). He had received a total of 20 units of packed cells prior to embolization over a period of 8 weeks. The DSA of both in both left and right internal iliac artery revealed an extensive tumour blush in the vesical artery territories pre-embolization (Plate 2).

The DSA of right internal iliac artery combined with a multipurpose catheter and microcatheter post embolization with percutaneous vertebral augmentation slurry showed near total devascularization of the neovascularity (Image 3a of Plate 3). Similarly, DSA of the left internal iliac artery showed a marked reduction in tumour blush (Image 3b of Plate 3). After 30 days post embolization, we observed significant reduction in haematuria and no further transfusion. Haemoglobin over the period of 30 days post-embolization was 8 - 8.5 g/dL and he reported improved quality of life because he required less help in doing simple daily activities. He reported mild post embolisation abdominal pain within 48 h which was managed with paracetamol.

DISCUSSION

Hemorrhage is a common complication of peptic ulcer disease and malignancies respectively seen in Case 1 and Case 2. It may present as haemoptysis, haematemesis, haematuria, or melaena. In advanced genitourinary malignancies, there may be massive intractable bleeding related to local spread of the disease, neovascularization, post-radiation cystitis, or chemotherapy induced cystitis [6,7]. Haematuria in our patient (Case 2) was likely due to neovascularization with sloughing of the tumour and worsened by post-radiation cystitis as seen in Plate 3a. Intractable haematuria secondary to bladder haemorrhage is potentially lethal and constitutes a therapeutic challenge [3,6]. Treatment options include percutaneous arterial embolization, intravesical instillation of formalin, the hyperbaric oxygenation (flushed) radiotherapy [8], urinary diversions and palliative cystectomy [7]. In many patients, including our patient in Case 2, severe haematuria was not controlled by conservative measures [3-7,9] and cystectomy is not always an option since these patients often have a high surgical risk [3,6,7]. Therefore, the availability of emergency therapeutic embolization is most desirable. However, this service is rarely available in most health facilities in Ghana and other developing countries due lack of well-trained radiologists, trained support staff, or equipment [5]. Also, there is difficulty in accessing tertiary hospitals due to poorly structured referral systems in Ghana, which might deny patients the opportunity for early detection of the cause of bleeding.

Frequent hospital admissions for blood transfusions and irrigation of the bladder in current clinical practices in resource-limited settings are not feasible and negatively affect the patient's quality of life, while radical surgery carries a high risk [3,6]. Therapeutic embolization offers immediate control of potentially fatal haemorrhage, improves palliative care and quality of life, and reduces the need for frequent cystoscopy, irrigation of the bladder and blood transfusions [6,9]. In most cases, embolization is well-tolerated, reducing the need for surgery [6,9], and can be repeated if necessary [9]. If there is a need for surgical intervention, the patient's general health status will be better preserved and there tends to be a reduced need for intraoperative transfusions [9].

Super-selective embolization of vesical arteries was first described by Kobayashi et al. [10]. The technique is now accepted as a treatment option for haemorrhagic cystitis, radiation-induced cystitis and bladder tumors [11,12,13]. A total of 29 out of 32 patients who had arterial embolization due to haematuria in Russia had complete cessation of haematuria and one patient had significantly reduced indication for transfusion [13]. This study further reported post embolization syndrome and transient gluteal claudication as complications [13]. On the contrary, as observed from Plate 3a and 3b, our patient in Case 2 did not report any complication but showed an improved devascularization of the neovascularity. Similar to the study

in Russia, systematic review by Taha et al. [14] from 1978 - 2016, found 295 patients, aged 51 - 95 yr. who underwent selective embolization of the internal iliac artery for intractable bladder hemorrhage. They reported a success rate of 43 - 100 with post-embolisation syndrome as the commonest complication. However, our findings suggest that arterial embolization due to haematuria in resource-limited countries could be used to address intractable bleeding involving the bladder.

Posteriorly located duodenal ulcers are often complicated by malaena and hematemesis. This is due to erosion into the gastroduodenal artery or extensive duodenitis. One of our patients (Case 1) had extensive duodenitis. Other complications include perforation and gastric outlet obstruction [9]. A previous study by the American Society for Gastrointestinal Endoscopy reported that 15.6% of patients with bleeding ulcers required surgical intervention [9]. Management of hemorrhage in the acute phase requires transfusion of packed cells. In chronic anaemia, patients may require multiple transfusions scheduled daily or weekly. Other forms of management include minimally invasive procedures such as endoscopic sclerotherapy, band ligation and percutaneous arterial embolotherapy [15]. As in Case 1, a DSA was performed alongside C2 cobra catheter in the common hepatic artery and microcatheter in the gastroduodenal artery (Figure 1a). Percutaneous transarterial catheter embolization is an established minimally invasive procedure to occlude or decrease flow of blood [6]. It has a myriad of clinical applications including but not limited to post-partum hemorrhage, multiple traumatic pelvic fractures, bleeding peptic ulcer, intractable haematuria, transarterial chemoembolization of hepatoma [16,17]. It employs local anaesthesia and requires shorter hospital stay relative to open surgery.

Supers elective transarterial catheter embolization is safe, largely due to the extensive collateral supply to most of the structures particularly in the gastrointestinal tract and genitourinary tract with reported ischaemic complications rate of 0 to 22% [18, 19]. On the other hand, a systematic review on embolisation for intractable nonvariceal upper gastrointestinal bleeding reported 93% technical success and 67% clinical success rates while 15% had repeat embolization to control the bleeding [20]. Most of the series employed the sandwich method where both proximal and distal segments of the artery was embolized to reduced bleeding recurrence from collateral supply. Long term complication such as duodenal stenosis was reported with glue embolization of the terminal muscular branches of the gastroduodenal artery, occurring in 25% of the series [21]. In meta-analysis of 13 studies comparing surgery with trans arterial catheter embolization (TAE), there was reduced mortality and complication rate with the TAE group compared to the surgical group. However, the surgical group showed reduced rate of rebleeding and need for reintervention [22]. In this report, Case 1 reported no bleeding episode during a 12-week follow up post

embolization (Plate 1b). Both patients showed significant improvement without complications during the follow up period and were satisfied with the procedure. The application of this clinical procedure is safe, effective, reliable but expensive and not readily accessible for many patients in developing countries like Ghana.

Conclusions

Life threatening haemorrhage is a major complication to manage in a resource-limited country. Over the years in Ghana, medical and surgical options have helped to save many lives. However, percutaneous trans arterial embolization is a novel option in Ghana with great technical and clinical successes and has the potential for conserving the ever-depleting stocks of blood, shorter hospital stays, and fewer complications. We recommend further studies to better understand pattern of recovery and quality of life following arterial embolization. Also, investment in interventional radiology is necessary to improve access and utilization in Ghana.

DECLARATIONS

Ethical considerations

This study was approved by Ethics Committee of Euracare Advanced Diagnostic and Heart Center. Informed consent was obtained from the patients before their history was used in this case series.

Consent to publish

All authors agreed to the content of the final paper

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Competing Interests

No potential conflict of interest was reported by the authors.

Author contributions

BDS, contributed to the conception, radiological investigation of the cases, drafting of report, and final review of report.

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Availability of data

All relevant data are provided in the manuscript.

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