Selective Arterial Embolization of the Vesical Arteries in the Management of Intractable Bladder Hemorrhage

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Abstract:
Bleeding from a bladder tumor is a common presentation. Most bleeding can be managed conservatively but on certain occasions bleeding can be severe and hard to control. Sixteen patients who were presented with severe intractable bleeding secondary to bladder tumors and failed conservative management, underwent embolization of branches of the hypogastric arteries to control bleeding. Effective control of bleeding was achieved in 15 patients (94%).

In this review we present our experience in the management of intractable bleeding from bladder tumors by percutaneous embolization in respect of technical success, technique and complications

Introduction:
Severe bleeding from a urinary bladder wall tumor can be life threatening. Its management is a difficult problem. There are several methods used for controlling bladder bleeding, including irrigation with alum solution\(^1\), cystoscopic clots evacuation with cauterization\(^2\), instillation of formalin\(^3\) and even open surgical techniques which range from urinary bladder compression to cystectomy and urinary diversion to an ileal conduit\(^4\). Most of those patients, however, are severely ill, elderly and are at high risk for major surgical procedures and for general anesthesia.

Transcatheter arterial embolization has been reported to be an effective alternative method for controlling bleeding from a bladder tumor and other pelvic malignancy. This can be performed under local anesthesia in patients over 25 years\(^5,6\). In this article we report our experience with the embolization technique in 16 patients.

Patients and Methods:
Between June 1996 and January 2000, 16 patients (13 males and 3 females) with a mean age of 62.8 years (48-70), underwent embolization of the hypogastric arteries for control of severe intractable bladder bleeding (bleeding > 500 cc/24hrs) in 13 patients and for treatment of recurrent episodic hemorrhage in three (Figures 1 & 2). In all the patients bleeding was secondary to a bladder tumor. Eight patients who presented with severe intractable bleeding had received radiotherapy and all...

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Figure 1: Selective catheterization of the anterior division of the left iliac artery showing abnormal vascularity and blush in the vesical arteries.

Figure 2: Post embolization angiogram with polyvinyl alcohol particles show absence of the vascular blush in the vesical branches.
had invasive tumor recurrence at presentation for embolization. In two patients bleeding was post-cystoscopy and in the other six it was spontaneous.

Embolization was indicated in these patients after multiple conservative measures to control bleeding were unsuccessful (cystodiathermy, Helmestein-Balloon compression and packing the bladder, instillation of formalin, and irrigation with alum). Using the Seldinger technique the common femoral artery was punctured with a standard arterial needle, a pigtail catheter was used to perform pelvic angiogram, then a 5 French head Hunter or Simmons catheter was used for selective catheterization of the internal iliac arteries. Vesical angiography was performed after selection of the hypogastric arteries.

In the first nine patients embolization was performed using a standard 5 French catheter. In seven patients a microcatheter (Tracker 18) was used for superselective catheterization of the inferior and superior vesical arteries to perform a target embolization. Polyvinyl alcohol particles (permanent embolic material) in the range of 45-500 micron were used in five patients, and gel foam pledges (temporary embolic material) was used in eleven.

Bilateral internal iliac embolization was done in 10 patients and unilateral in six. The decision for bilateral versus unilateral embolization was based mainly on the cystoscopic findings of a predominant disease on one side as well as on lateralization of abnormal vesical branches on the pelvic angiogram. The procedure was terminated when there was complete obliteration of the vesical arteries or if the patient complained of severe pain. An immediate post-embolization control angiogram was done to verify adequacy of embolization. All the cases were done under local anesthesia with sedation.

The patients were followed up clinically for one hour and one, three and seven days after the procedure.

Results:

Complete cessation of bleeding was achieved in 11 patients within 24 hours of embolization. Bilateral embolization in this group was done in seven patients and unilateral embolization in four. In two patients bleeding continued following unilateral embolization but was significantly reduced with a complete stop at three days. In another two patients bleeding following initial unilateral embolization was continuous for one week but a repeat of embolization done bilaterally achieved control within 24 hours.

In one case the bleeding was continuous with no evidence of reduction or control after one week even after a second session of bilateral embolization. In this case ultrasound demonstrated left hydrenephrosis and an antigrade pyelogram showed a filling defect in the distal end of the left ureter. Cystouretroscopy found a villous tumor at the lower end of the ureter.

The procedure under local anesthesia was well tolerated by all patients. Fourteen patients developed mild pelvic pain and buttock pain which subsided within 48 hours with rest and analgesia. In one patient pain persisted for one week and was partially controlled by analgesia. One patient developed sciatic nerve injury, most probably due to vascular ischemia of the nerve sheath.

Discussion:

Severe bleeding secondary to bladder tumor can be a life threatening problem and its management remains a difficult clinical experience. In 1974 Hald and Mygind were the first to report the effectiveness of percutaneous transarterial embolization for the control of bladder hemorrhage. Since then others have found the technique of value with good initial control of bleeding being reported in 80-100% of cases with a life long control.

The wide variety of management methods used for the control of severe bleeding from urinary bladder tumors reflects the difficulty in controlling the bleeding by any one method alone. The method had also proved to be very effective in bleeding control in two patients after cystoscopy. The successful use of embolization in peri-operative bleeding control has also been described previously.

The blood supply to the urinary bladder is provided by paired vesical arteries which have an anterior course. The aim of embolization is to produce occlusion of the vascular beds of the tumor as distal as possible, in order to reduce the perfusion pressure of the tumor vessels, therefore small particles appear more effective in controlling the bleeding.

In our study, internal iliac artery embolization proved a safe and effective method for achieving this. Unilateral embolization based on a cystoscopic result could be a successful procedure to control bleeding from a bladder tumor but bilateral internal iliac artery embolization should be undertaken if one side failed to stop the bleeding.

Comparing our study to others, Kobayashi et al 1980, Melvor et al 1982, Appleton et al 1988, Gurjral et al 1999, who achieved 80%-100% control, our success in controlling the bleeding in 15 patients (94%), is a good comparable result.

Pain associated with this procedure is usually ischemic, which in most instances is well tolerated. The buttock pain and sciatic nerve injury are most likely due to embolization of the superior gluteal artery as it arises from the posterior division of the internal iliac artery. This can be avoided with superselective catheterization of the anterior division of the internal iliac artery using microcatheters prior to injecting the embolization agent.

The ability to perform these procedures under local anes-
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Thesia accounts for the low morbidity. The radiologist who does this procedure should be experienced with selective catheterization and embolization. State-of-the-art angiographic equipment is essential for detailed arteriography, to minimize the x-ray dose, and for the performance of superselective catheterization.

In conclusion, good and effective control of bleeding from bladder tumors can be achieved with percutaneous embolization with low morbidity and mortality.

References: