

## Superselective Embolization of the Inferior Vesical Artery for the Treatment of Intractable Hematuria from Pelvic Malignancy: Case Report<sup>1</sup>

악성종양으로 인해 조절되지 않는 혈뇨환자에서 양측 하방광동맥의 색전술을 이용한 치료: 증례 보고<sup>1</sup>

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Intractable hematuria in from pelvic malignancy can be managed with conservative treatment in most patients. However, when treatment fails, surgical intervention may be required. Unfortunately, in most cases, the general condition of most patients is unfavorable for major surgery, with many patients having an inoperable status. We present two cases where intractable hematuria was successfully controlled by bilateral embolization of the inferior vesical artery with polyvinyl alcohol particles. Hematuria did not recur during the subsequent period and no complication was observed. Thus, bilateral embolization of the inferior vesical artery should be considered as an alternative method for the treatment of massive intractable hematuria caused by pelvic malignancy.

### Index terms

Hematuria  
Therapeutic Embolization  
Urinary Bladder Neoplasm  
Prostatic Neoplasm

## INTRODUCTION

Massive intractable hematuria in the urinary bladder remains a bothersome-and sometimes life-threatening-problem in clinical practice. Regardless of the cause, initial treatment is conservative. However, in some cases, hematuria is not controlled with such conservative management (1). Since Hald and Mygind first reported the use of transarterial embolization to control massive intractable hematuria, several studies regarding transarterial embolization of the internal iliac artery (IIA) for control of massive bladder hemorrhage have been reported (2-10). We present two cases of intractable hematuria that were successfully managed by superselective transarterial emboliza-

tion of the inferior vesical artery using 350 to 500  $\mu$ m polyvinyl alcohol (PVA) particles (Contour; Boston Scientific, CA, USA) without evidence of complication.

## CASE REPORT

### Case 1

A 76-year-old man with a history of advanced prostate cancer was admitted with massive hematuria and voiding difficulty. A computed tomography scan showed large prostate cancer with a large hematoma in the urinary bladder (Fig. 1A). Gross hematuria continued despite continuous bladder irrigation with normal saline and hemoglobin levels did not respond to con-

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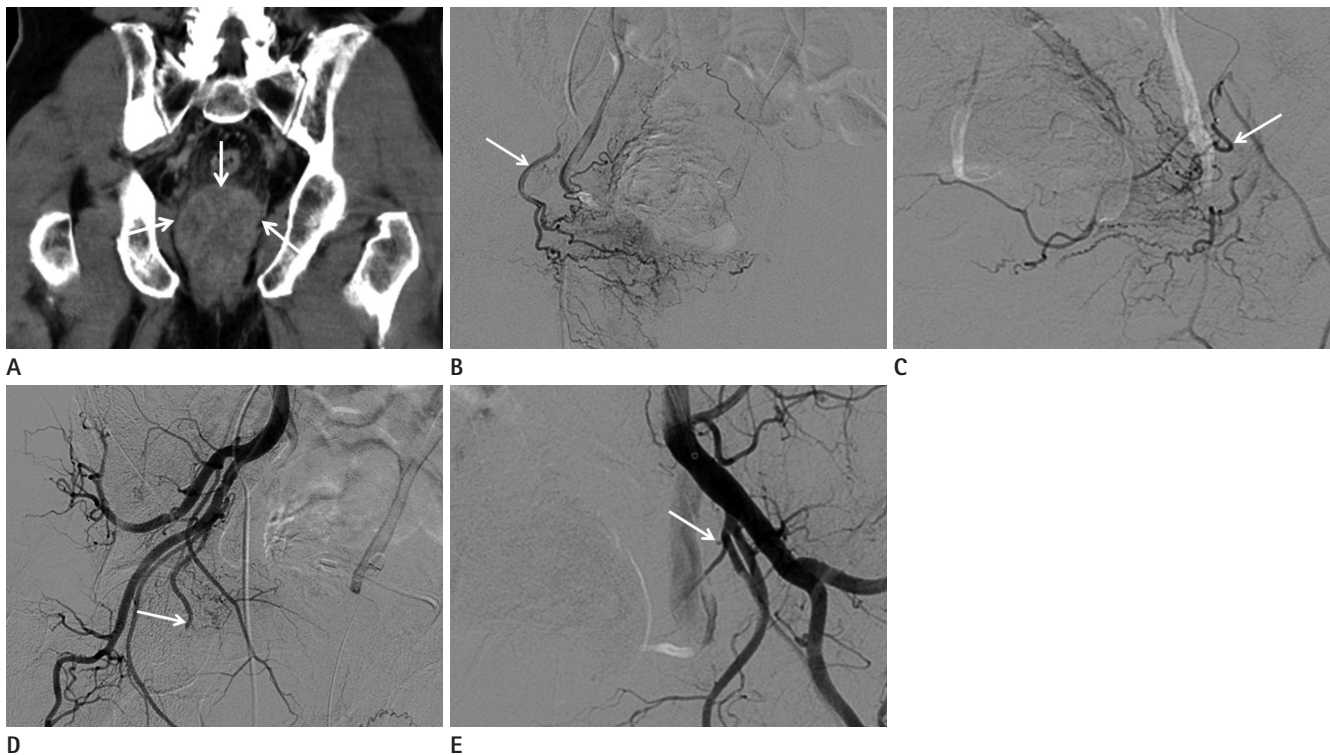
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tinued transfusion. The patient's hemoglobin level was 9.4 g/dL and his general condition was not suitable for surgical treatment. Consequently, on hospital day 18, the patient underwent transarterial embolization to control the intractable hematuria. Bilateral IIA angiography showed hypertrophy of the bilateral inferior vesical arteries (Fig. 1B, C). Bilateral inferior vesical arteries were superselected using a 2.0-F microcatheter (Progreat alpha; Terumo, Tokyo, Japan) and embolized using 350 to 500  $\mu$ m PVA particles until stasis was achieved (Fig. 1D, E). The patient's urine was clear on the following day and no further hematuria was observed until discharge. His hemoglobin level was 11.2 g/dL on the two days after the procedure. The patient had no complications. After 2 months, the patient died due to pneumonia. However, hematuria had not recurred during this 2 month follow-up.

## Case 2

A 66-year-old woman with advanced transitional cell carcinoma (TCC) of the urinary bladder presented at our institution

due to massive hematuria and voiding difficulty for 2 days. A CT scan showed a large hematoma of the bladder and a huge bladder mass (Fig. 2A). No active bleeding focus was observed in this CT scan. The patient had undergone an emergency cystoscopy for hematoma evacuation and had been managed conservatively with continuous bladder irrigation accompanied by normal saline and transfusion of packed red blood cells. She received conservative treatment for 3 days, but hematuria persisted and her hemoglobin level did not respond to these treatments. Her hemoglobin level was 8.5 g/dL, but her general condition was not suitable for surgical treatment. Consequently, she was rescheduled for transarterial embolization to establish hemostasis. A bilateral IIA angiography showed hypertrophy of the left superior vesical artery and both inferior vesical arteries (Fig. 2B, C) (11). Both inferior vesical arteries were superselected using a 2.0-F microcatheter (Progreat alpha) and angiography was performed, followed by embolization using 350 to 500  $\mu$ m PVA particles. For several hours after embolization, hematuria was markedly decreased and the patient's urine



**Fig. 1.** Images from a 76-year-old man with intractable hematuria caused by bladder invasion of prostate cancer (case 1).

- A. Coronal contrast-enhanced computed tomography scan shows prostate cancer (arrows).
- B. Superselective right inferior vesical artery angiography shows hypertrophy of the right inferior vesical artery (arrow).
- C. Superselective left inferior vesical artery angiography shows hypertrophy of the left inferior vesical artery (arrow).
- D. Follow-up angiography of the right internal iliac artery after embolization shows complete obliteration of the right inferior vesical artery (arrow).
- E. Follow-up angiography of the left internal iliac artery after embolization shows complete obliteration of the left inferior vesical artery (arrow).



**Fig. 2.** Images from a 66-year-old woman with intractable hematuria caused by bladder cancer (case 2).  
**A.** Axial contrast-enhanced computed tomography scan shows recurrent bladder cancer (arrows) at the left inferior wall of the bladder.  
**B.** Superselective angiography of the right inferior vesical artery shows hypertrophy of the right inferior vesical artery (arrow).  
**C.** Left internal iliac artery angiography shows hypertrophy of the left superior vesical (black arrow) and left inferior vesical arteries (white arrow).

color was nearly clear. On the following day, a cystoscopic examination showed complete hemostasis, and her hemoglobin level was 11.3 g/dL. On post-procedural day 6, the patient had undergone radiation therapy for the treatment of TCC, and was then discharged with an improved general condition. No further complication related to this procedure occurred.

The patient died 5 months after procedure due to pneumonia. However, hematuria did not recur during these 5 months.

## DISCUSSION

Traditionally, bladder hemorrhage has been treated by conservative treatment or surgical repair. But, in case of refractory hemorrhage, conservative treatment is not always successful. Furthermore, surgical treatment is limited in these patients because their general condition is often not suitable.

To overcome these limitations, several reported cases have described transarterial embolization of both IIA for the treatment of intractable bladder hemorrhage (3, 12, 13). Generally, the bladder is supplied primarily by the superior and inferior vesical arteries, which are derived from the anterior trunk of the IIA (11). The superior vesical artery supplies the fundus of the bladder, while the inferior vesical artery supplies the base of the bladder, prostate, seminal vesicle, and lower ureter (11). The prostate arteries are mainly branches of the inferior vesical arteries (11). Complete embolization of both IIA for the treatment of bladder hemorrhage caused by a malignant condition may be considered to be overtreatment and drawbacks such as neurologic complications, chronic urinary retention, bladder

necrosis, and unwanted buttock pain (3, 12, 13).

To reduce these potentially major complications, selective embolization of the anterior branch of the IIA has been attempted in several reports (8, 9). However, these complication risks persisted (8, 9).

We performed two cases of superselective embolization of both inferior vesical arteries for the treatment of intractable bladder hemorrhage, and not only reduced the complication rate but also maximized the embolization effect. Technical and clinical success was achieved, without evidence of complications, such as bladder necrosis. In Case 1, the patient had prostate cancer with invasion of the base of the bladder. Thus, embolization of the bilateral inferior vesical arteries was sufficient for the treatment of intractable hematuria. However, in Case 2, we did not embolize the left superior vesical artery despite evidence of hypertrophy. In this patient, the main feeding artery of the bladder comprised the left superior vesical artery and both inferior vesical arteries. The bladder mass was located at the base of the bladder, leaning towards the left side, and we thought that the left superior vesical artery partially caused the bladder hemorrhage. However, no right superior vesical artery was observed. As a result, we did not perform the left superior vesical artery embolization to avoid the potential risk of bladder necrosis. The main blood flow into the bladder mass would be reduced by embolization of both inferior vesical arteries, and bladder hemorrhage ceased after the procedure. No complication or recurrent hematuria was observed during the follow-up period.

We chose the PVA particles as the embolic material to maxi-

mize the embolic effect (5, 8, 9, 14).

In conclusion, transarterial superselective embolization could be considered for the treatment of intractable bladder hemorrhage in which no response is observed from medical treatment.

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## 악성종양으로 인해 조절되지 않는 혈뇨환자에서 양측 하방광동맥의 색전술을 이용한 치료: 증례 보고<sup>1</sup>

이현정<sup>1</sup> · 최선영<sup>2</sup> · 전의용<sup>1</sup> · 한금현<sup>3</sup>

골반내 악성종양으로 인해 조절되지 않는 혈뇨가 있는 경우 일반적으로 보존적인 방법으로 치료한다. 그리고 보존적인 방법으로 치료가 되지 않는 경우 수술적 치료가 요구되고 있다. 그러나 이러한 환자들은 대부분 전신상태가 수술적 치료를 받기 어려운 상태여서 혈뇨의 치료에 실패하는 경우가 있다. 저자들은 골반내 악성종양으로 인해 조절되지 않는 혈뇨가 발생하였으나 보존적인 방법으로 치료가 되지 않은 2명의 환자들에 대해서 양측 하방광동맥을 초선택하여 polyvinyl alcohol particles을 이용하여 색전하였다. 두 명의 환자 모두 혈뇨는 성공적으로 치료되었으며 합병증도 발생하지 않았다. 골반내 악성종양에서 보존적 방법으로 치료되지 않는 조절되지 않는 혈뇨가 발생할 경우 양측 하방광동맥의 색전술이 수술적 치료의 대안이 될 수 있다.

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