Artificial Embolization of Renal Angiomyolipoma with Absolute Ethanol

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INTRODUCTION

Since transcatheter embolization was first introduced by Almgard et al. (1973), many embolic materials has been applied to this technique with their own advantages and disadvantages. Failures of permanent occlusion with some embolic agents such as autologous clot, Oxycel, Gelfoam, Buercrylate, and Gianturco coils have been reported (Woodside et al., 1976; Gang et al., 1977; Greenfield et al., 1978; Chuang and Wallace, 1981; Mazer et al., 1981.) As a new liquid occlusive material, absolute ethanol was reported to cause renal infarction in canine kidneys (Ellman et al., 1980). After the experimental report, ablation of renal tumors was successfully made in patients of hypernephroma (Ellman et al., 1981).

This report presents a successful treatment of persistent hematuria due to angiomyolipoma by palliative ablation of the tumor with intraarterial injection of absolute alcohol in a young lady suffered from tuberous sclerosis since her birth.

CASE REPORT

A 25 years old female was admitted to the Seoul National University Hospital because of total gross hematuria suddenly developed 2 days ago.

This young lady had seizures prior to one year of her age. Around seven of her age she started to have a few skin lesions on her face. At that time clinical diagnosis of tuberous sclerosis was made.

On physical examination, she was slightly emaciated and had pale conjunctiva. Two large masses were palpable in both sides of upper abdomen above the level of umbilicus. On CBC examination, Hb was 9.0 and Hct. 28.

Findings in sonography and CT of the abdomen were consistent with multiple large angiomyolipomas of both kidneys and the liver.

Aortography and selective both renal arteriographies were done for further evaluation of recurrent massive gross hematuria on 10th

Fig. 1. (a) Preliminary aortography reveals large bilateral angiomyolipomas supplied from both renal arteries.
transfused for the replacement of blood loss due to recurrent hematuria.

On the 104th hospital day intraarterial ethanol infusion was attempted to ablate the tumor of right kidney palliatively expecting control of the hematuria with preservation of normal parenchyme in upper one third. Informed consent was obtained from the patient. After right renal arteriography by Seldinger technique using 7F catheter, a total of 20cc ethanol was delivered subselectively into two segmental branches of right renal artery supplying main masses at a rate of 2ml per second. During the injection the patient complained of mild discomfort in right flank area. Fifteen minutes after the ethanol

hospital day. Both kidneys were replaced by multiple lobulated hypervascular masses suggesting angiomyolipoma (Fig. 1a). Relatively intact renal parenchyme was partially preserved with opacification of calyces in upper one third of both kidneys (Fig. 1b).

On 30th hospital day cystoscopy was done. Evidence of active bleeding was noticed from right ureteral orifice. In spite of conservative treatment with transfusion, intermittent gross hematuria wouldn't subside. Nevertheless, surgical management was not taken into consideration because of the bilateral renal involvement of the large masses and the same bleeding potentiality from the left renal tumor.

For about 3 months of her admission 41 pints of packed cell and 49 pints of whole blood were

Fig. 1. (b) Selective right renal arteriography shows tortuous neovascularities of the lobulated angiomyolipoma and relatively intact renal parenchyme in upper one third.

Fig. 2. (a) Selective right renal arteriography was made 15 min after subselective infusion of 20cc alcohol through two segmental branches respectively. The angiogram revealed nearly total ablation of the lobulated tumor with preservation of renal parenchyme.
injection right renal arteriography followed. Abnormal vasculatures of the angiomyolipoma distal to the segmental arteries were disappeared due to complete occlusion of those blood vessels (Fig. 2a). Hematuria completely subsided after the treatment. No significant complication was noticed except dull pain in right flank which was controlled with valium. A follow-up right renal arteriography 15 days later showed nearly complete ablation of tumor vessels except a few small foci adjacent to the preserved normal parenchyme. And calyces of the upper one third were clearly opacified (Fig. 2b).

In order to trim the small foci of residual tumor 2cc of ethanol was injected into the segmental arteries at a slower rate. At this time severe flank pain was complained. Follow-up arteriography showed slight changes with further decrease of the tumor vessels (Fig. 2c).

The flank pain and nausea appeared for 2 following days and were controlled with sedatives. Hematologic pictures were improved to 11 in Hb and 32.6 in Hct. The patient was uneventful and discharged 10 days after the follow-up arteriography.

**DISCUSSION**

Bilateral multiple involvement of angiomyolipoma is present in 50 to 80% of tuberous sclerosis. In those patient, spontaneous infarction, retroperitoneal hemorrhage or hematuria can occur as a complication of the hypervascular tumor (Emmett and Witten, 1971).

There are many kinds of embolic materials for occlusion of renal artery to control hematuria or cause renal infarction and most of them are solid.

Solid embolic materials were reported to have many disadvantages as follows (Ellman et al., 1980; Ellman et al., 1981): 1) difficulty in administration through catheter, 2) need of special instrument such as balloon catheter, 3) incomplete infarction due to transient and
proximal occlusion, 4) accidental embolization of non-target organ.

On the contrary, those problems can be solved with liquid materials. As a liquid occlusive material, cyanoacrylate has ability to form an instant vessel plug. However, some technical difficulties were emphasized and various method was designed to prolong the polymerization time of cyanoacrylate by adding iophendylate or Lipiodol (Papo et al., 1981). After transcatheter injection of absolute ethanol was made to infarct kidneys of dogs easily and safely, absolute ethanol was introduced clinically to cause ablation of malignant renal tumors of 6 patients successfully by Ellman et al. (Ellman et al., 1981). In those patients the postembolization syndrome of pain, nausea, vomiting and fever was minimal.

As a new liquid sclerosing material, advantages of absolute ethanol can be summarized as follow (Ellman et al., 1981): 1) easy delivery through catheter, 2) adjustable in injection amount and rate, 3) complete infarction by peripheral embolization, 4) aseptic fluid with no systemic complication, 5) no danger of accidental embolization of non-target organ.

Two intraarterial mechanisms of ethanol were postulated. Intravascular clot formation occurs through denaturation of serum protein and RBC mainly in slow infusion. And direct tissue damage appears through the reaction with vascular wall and perivascular tissue (Ellman et al., 1980; Ellman et al., 1981).

Injection volume should be determined according to degree of tumoral vasculature and body weight, usually below 0.5cc/kg (Ellman et al., 1981). One should take heed of clot formation in the syringe containing alcohol during regurgitation of blood for removal of air bubble just after connection. To prevent the clot formation normal saline should be filled just before alcoholic infusion using three way stopcock.

Finishing the alcoholic infusion residual alcohol in the catheter should be washed out with normal saline immediately and not be removed with regurgitation.

This absolute ethanol infusion technique is easy and safe and expected to be used in control of hematuria in malignant and benign tumors and other benign conditions such as arteriovenous malformation or traumatic arteriovenous fistula.

**SUMMARY**

Transcatheter injection of absolute ethanol into renal artery was applied in a patient of tuberous sclerosis suffered from persistent hematuria due to renal angiomyolipoma. The hypervascular tumor causing hematuria was palliatively ablated with absolute ethanol and the hematuria was controlled immediately. Advantages of absolute ethanol as a liquid occlusive material were discussed.

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無水エタノールを利用した 腎血管筋肉脂肪腫の人为的塞栓

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朴在亨・韓萬青・李宗郁

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REFERENCES


