

## 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, Bucrylate, 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 intra-arterial 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

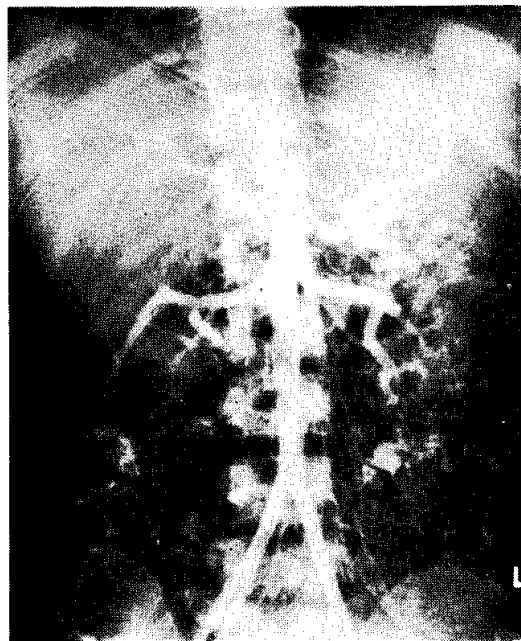


Fig. 1. (a) Preliminary aortography reveals large bilateral angiomyolipomas supplied from both renal arteries.



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

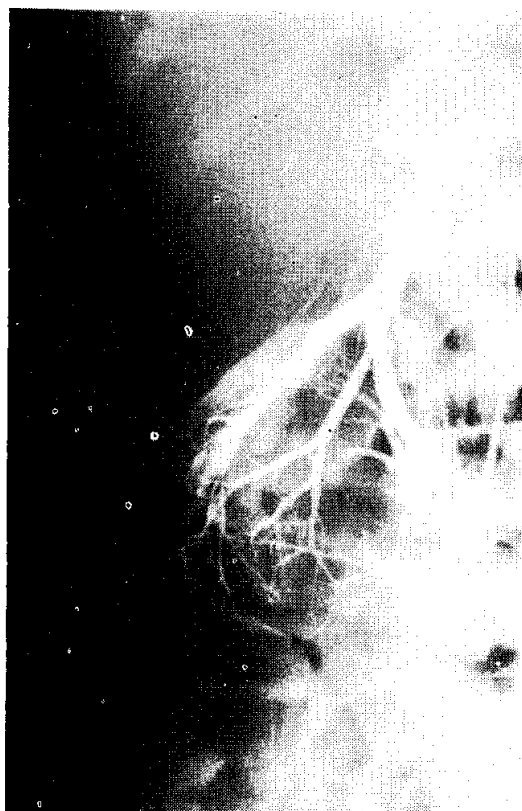
hospital day. Both kidneys were replaced by multiple lobulated hypervascular masses suggesting angiomyolipoma (Fig. 1a). Relatively intact renal parenchyme was partially preserved with opacification of calyces in upper one third of both kidneys (Fig. 1b).

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

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



**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.



Fig. 2. (b) Follow-up study 15 days later shows small vascular tangles around the normal 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



Fig. 2. (c) Arteriography after infusion of 2cc ethanol subselectively demonstrates further decrease of the neovascularities.

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 89% 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 angiomyolipomas. 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.

### —國文抄錄—

#### 無수에타놀을 이용한 腎血管筋肉脂肪腫의 人爲的 塞栓

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最近 血管造影用 카테타를 통한 人爲的 塞栓이 여러 가지 塞栓物質을 使用하여 試圖되고 있음은 周知의 事實인 바 그중 注目할 것은 새로운 液體塞栓物質으로서의 無수에타놀의 登場이다.

無수에타놀의 長點으로는 첫째 카테타를 통한 注入이 容易하다는 點, 둘째 注入量과 速度를 調節할 수 있다는 點, 셋째 末梢의 塞栓으로서 完全한 硬塞을 招來하는 點, 넷째 體內에서 代謝되는 無菌性 液體라는 點等を 들 수 있다.

著者들은 2日동안의 肉眼的 血尿를 主訴로 하여 서울대학교病院 泌尿器科에 入院하여 兩側性 腎血管筋脂

肪腫을 同伴한 結節性硬化症으로 診斷받은 25才 女子에서 無水에 타눌을 利用한 人爲的塞栓을 實施하였다. 右側 腎動脈에서 腎血管造影術을 實施한 直後 腫瘍을 供給하는 腎血管分枝 들에 各各 10cc씩 都合 20cc의 無水에 타눌을 秒當 2cc로 注入하였고 追跡檢査를 15分後와 15日後에 各各 實施하였던 바 患者의 血尿는 人爲的 塞栓 施行 다음날 完全히 消失되었으며 別다른 副作用없이 좋은 經過를 보여 患者는 退院하였다.

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