

Venography in Pelvic Fractures: A Clinical Evaluation

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THE PURPOSE of this report is to present a technic for venography and evaluate its role in determining the site and rate of venous bleeding.

The complication of hemorrhage associated with pelvic fractures is well known and the decision regarding the necessity for operative intervention for control is a most difficult one. This decision is generally predicated on continued clinical observation of the rate of hemorrhage. Ravitch⁶ recommends that operation be delayed until the patient fails to stabilize after administration of more than 20 units of blood while Miller⁸ advocates hypogastric artery ligation for control of hemorrhage at an earlier stage.

Recently, Motsay, Manlove and Perry⁴ reported lacerations or transections of the common iliac vein in association with pelvic fractures. They suggested that immediate venography via the femoral vein might demonstrate extravasation of contrast medium at the site of the venous injury.

Material

Twenty-five patients with pelvic fractures demonstrated by AP radiographs were subjected to femoral vein venography on admission to the Trauma Service of the Misericordia-Fordham Affiliation.

Technic

1. The patient was taken to the X-ray Department after initial resuscitation and the insertion of an indwelling catheter.

2. Both femoral regions were prepared and draped and the common femoral veins

cannulated bilaterally with 17 gauge intra-caths.

3. A cystogram was performed in the routine manner.

4. Simultaneous bilateral manual femoral vein injections of 50 cc. of 50% hypaque was made with immediate post-injection films. Five, 15, and 30 minute pyelograms were taken.

Results

In all pelvic fractures studied, visualization of the iliac veins was obtained. Of 25 patients, 24 had normal venograms. Figure 1 shows a normal venogram with visualization of both iliac veins and inferior vena cava. Of these normal studies, one required surgical intervention for control of hemorrhage after 3,000 cc. of whole blood were administered. The operative finding was a torn ilial mesentery with intraperitoneal hemorrhage. One patient died within 2 hours of admission from multiple injuries including cranio-cerebral injury.

One study showed a tear of the right iliac vein. Figure 2 shows extravasation of contrast medium from a lacerated right iliac vein, the left being normal.

The authors believe that extravasation of contrast medium at the site of venous injury provides objective evidence of venous injury. There is no significance in negative pelvic venography by this technic, and no information as to the rate of hemorrhage is provided. Localization of bleeding from venous plexuses was not feasible by this method.

This clinical study shows that the only value of venography was to provide objec-

FIG. 1. Normal venogram shows both iliac veins and inferior vena cava.



tive evidence for immediate surgical intervention for iliac venous rupture as an isolated complication of pelvic fracture. It was of no value in determining clinical management or ultimate prognosis with regard to hemorrhage secondary to pelvic fractures.

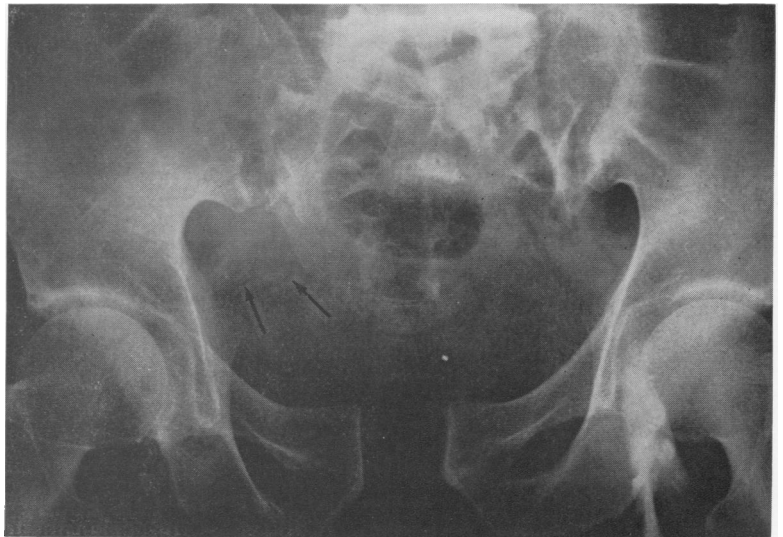
Discussion

The site of hemorrhage from pelvic fractures is difficult to identify. Lack of evidence as to the bleeding site leads to con-

sideration of many sources. One source which can be identified is at the fracture site particularly in the anterior bony pelvis. In general, bleeding is more frequently venous than arterial since pelvic veins are arranged in large plexuses and larger veins have a closer bony relationship than do arteries.

In the recent report⁴ of four instances of pelvic fractures with secondary laceration or transection of iliac veins, it was stated that these injuries accompanied mas-

FIG. 2. Arrows show the lacerated iliac vein on venography.



sive pelvic fractures with iliac or sacral disruptions. Three of the four patients were pedestrians struck by automobiles, and it seems unlikely that spontaneous cessation of bleeding would have occurred with venous injuries as severe as in these cases. In such cases, immediate venography via the femoral vein might have demonstrated extravasation of contrast material at the site of venous injury. In our patient with iliac vein rupture there was severe sacroiliac disruption. Venography demonstrated the lacerated iliac vein, Figure 2.

Miller,³ confining his remarks to instances of bleeding of arterial origin, reasoned that the superior gluteal artery was most at risk because of its close relationship to the bone. Ligation of the hypogastric artery was recommended for control of bleeding if hypovolemic shock was not readily reversed and blood pressure maintained by transfusions of whole blood. This concept of surgical management has not been generally accepted, however.^{5,6} Recent experiments¹ in animals suggest that it is not possible to lower venous pressure by ligation of the internal iliac arteries and control all accessory collateral sources of blood supply. It follows that bleeding from a major venous source in the animal cannot be managed by the control of arterial inflow.

In this clinical study, pelvic venography can determine venous bleeding secondary to lacerated or transected iliac veins, both common and external. Localization of venous bleeding other than from the iliac veins is not feasible by this method. Venography can influence the surgical management of hemorrhage secondary to pelvic fractures only when positive, since immediate operation appears indicated if laceration or transection of one or both iliac veins is demonstrated.

Our experience and that of others indicates that this site of major venous bleeding is seen only in severely disrupting pel-

vic fractures with sacro-iliac displacement. Trans-femoral venography is recommended, therefore, only in this type of pelvic fracture. It was of no value in the management of other types of pelvic fractures. Rate of hemorrhage remained the single most important factor in the decision for operative intervention.

The role of manual reduction of pelvic fractures and manual packing of the pelvic deserves further consideration. Early cessation of hemorrhage might be achieved by this method in displaced pelvic fractures only.

Summary

Technic of pelvic venography utilizing bilateral simultaneous femoral vein injections is described. Results of 25 consecutive clinical applications of this technic are included. The limitation in determining the site of the venous bleeding are such that the procedure is not recommended as a routine in all pelvic fractures. When pelvic fractures involve the sacro-iliac joint with severe disruption, venography may reveal injury to the external or common iliac veins.

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