UTERINE ARTERIOVENOUS MALFORMATION - AN UNCOMMON CAUSE OF A COMMON CONDITION

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Abstract:
Uterine Arteriovenous malformation (AVM) is a rare cause of vaginal bleeding, a common condition. It has characteristic Doppler, MRI and angiography findings. The treatment of choice is Trans arterial catheter Embolisation. Uterine AVMs are to be considered as an important, treatable cause of vaginal bleeding, when the common clinical causes are excluded.

Keyword: Uterine Arteriovenous Malformation, Doppler, MRI and Embolisation

The patient was a 42 year old premenopausal female, with Para 3 and live 3. She had complaints of continuous painless bleeding per vagina for the past 3 months. There had been intermittent bleeding with menorrhagia for the past 15 years. Her first 2 pregnancies were Full Term Normal Deliveries. She then had a Molar Pregnancy for which suction evacuation was done at 3 months amenorrhea. She had another pregnancy with normal delivery after the molar pregnancy 17 yrs ago. Her examination findings were as follows. Per speculum, she had bleeding from the os. Per vaginum examination showed a normal sized uterus with bilateral free fornices. Her BP was 100/70 mm Hg and her Hemoglobin was 10.2 g/dl. Her Beta HCG was less than 1mIU/mL.

The patient underwent Ultrasound of the Pelvis. Selected images are below.

Ultrasound
On Ultrasound, the uterus measured 10.9 x 8.6 x 6.4 cm. Dilated anechoic spaces were found in the myometrium. The endometrium appeared normal. The bilateral uterine arteries were dilated and tortuous. On color Doppler, the spaces took up flow. It was in different colors and directions. The Right uterine artery had a peak systolic velocity of 66.8 cm/sec, an end diastolic velocity of 30.7 cm/sec and a Resistive Index of 0.54. The Left uterine artery had a peak systolic velocity of 91.6 cm/sec, an end diastolic velocity of 47.6 cm/sec and a Resistive Index of 0.48. The uterine veins had arterialisation of the flow. The findings were typical of Uterine ArterioVenous Malformation (AVM).

The patient then underwent MRI of the Pelvis with post contrast MR angiogram. The images are as below.

**T1 sagittal**

**T2 sagittal**

**T1 Post contrast angiogram**
Maximum Intensity Projection image

T1 and T2 sagittal images showed the dilated tortuous uterine arteries bilaterally. Multiple flow voids were noted in the myometrium. Some were noted to be abutting the myometrium. The bilateral gonadal veins were noted to be dilated. T1 fat saturated post contrast images showed the flow voids filled with contrast. The internal iliac arteries were larger than the external iliac arteries. Early filling of veins was observed. The findings are typical of Uterine AVM. The case was managed by Uterine artery embolisation. It was done under strict aseptic precautions, under local anesthesia, under fluoroscopic guidance. Modified Seldinger’s technique was used, with the puncture done in the right femoral artery. A guidewire was passed via the right external iliac artery, right common iliac artery, upto the left common iliac artery. A Cobra 5 F catheter was then passed upto the guidewire tip and entered into left external iliac artery. The guidewire was removed and 5 F Roberts uterine catheter inserted and left internal iliac artery hooked. Subsequently the left uterine artery was superselectively catheterized beyond the cervico vaginal branch. Contrast (Iohexol) injection showed multiple tortuous dilated vessels characteristic of AVM. Embolisation was performed using Poly Vinyl Alcohol particles and gel foam.

Conventional angiogram Right uterine artery Embolisation

The angiogram image shows the conventional angiogram of dilated right uterine artery and the myometrial vessels. The next image shows the embolisation and the standing column of contrast. Comparison was done with Doppler pre n post embolisation images.
Doppler Pre embolisation

Doppler Post embolisation

The post embolisation Doppler images show the decrease in vascularity in the parametrial and myometrial vessels. Right Uterine artery Doppler comparison

The tables show that the Peak systolic and end diastolic velocities of both uterine arteries decreased significantly after embolisation. The resistive indices increased to normal levels.

Clinical and Doppler Follow up were done. The patient showed significant clinical improvement. She had regular menstrual periods with normal flow. The Doppler after 4 weeks post embolisation showed normal flow in bilateral uterine arteries with normal range of Peak systolic, End diastolic velocities and Resistive indices.

Discussion

Uterine Arteriovenous malformations were first described by Dubreil and Loubat in 1926. The incidence is 3.4 - 4.5% cases of pelvic bleeding. It is also known by various terms as Cavernous hemangioma, Cirrloid, racemose, arteriovenous aneurysm, Pulsa
tile angioma and Arteriovenous fistula. There are two forms, Congenital and Acquired. Congenital form is due to anomalous differentiation of capillary plexus. There are multiple feeding arteries and draining veins and an intervening nidus.

Acquired form has an identifiable cause. It is characterized by single or bilateral feeding uterine arteries. There is no extraterine arterial supply, and no nidus. Causes of Acquired AVM are multiple and include miscarriage, termination, dilation and curettage, cesarean delivery, carcinoma of the cervix or endometrium, uterine infection, trophoblastic disease, fibromas, endometriosis and uterine surgery.

The clinical features are with uterine bleeding. The patients with small AVMs may be asymptomatic. When symptomatic, they present with recurrent vaginal bleeding (menometrorrhagia) resistant to treatment. It may even be life-threatening. Sometimes, the cases present with habitual or spontaneous abortion. On vaginal examination audible bruits and a pulsatile mass are observed. The bleeding occurs when the vessels erode or abut the endometrium. The arteriovenous malformations of the uterus may be non specific on Ultrasound. Often, there is evidence of myometrial inhomogeneity. The vascular channels are visualised as tubular spaces in myometrium and the larger vascular spaces as anechoic spaces in myometrium. There is a normal appearing endometrium which helps to differentiate from Gestational Trophoblastic disease. There are also prominent parametrial vessels. Doppler imaging shows the tangle of vessels. The vessels in are in different flow velocities and different flow directions. This gives rise to the “Color mosaic” pattern. Also noted are aliasing, with juxtaposed reds and blue in Color Doppler imaging. Arteries show a high-velocity flow with a low Resistive Index. It is in the range of 0.25–0.55; the PI is 0.3–0.6. The venous flow has an arterial
pattern due to the direct communication with the arteries. MRI shows tortuous and tubular signal voids within the uterine myometrium. Cluster of serpentine flow-related signal voids within a thick myometrium is demonstrated. It is seen primarily in the myometrium, extending into the parametrium, and protruding into the endometrium. Contrast-enhanced dynamic subtraction imaging clearly shows the uterine vessels that become dilated and tortuous. The dilated internal iliac arteries and gonadal veins are noted on MRI. Early filling veins can be seen dynamically. Angiography is the Reference standard investigation. It shows the classic features of a complex tangle of vessels. The enlarged feeding arteries and early venous drainage during the arterial phase is appreciated. When there is a large clump of vessels, there is stasis of contrast medium. The differential diagnoses include Gestational Trophoblastic disease and Retained products of conception. Gestational Trophoblastic disease has a normal endometrium and arteriovenous malformations in the myometrium. But, unlike AVMs, it has an elevated beta HCG level. Retained products of conception has an echogenic mass in the endometrium with myometrial invasion causing anomalous arteriovenous communications. But the major vascularity is within the endometrium. Treatment of uterine AV malformations is based on the clinical status. Small and asymptomatic AVMs are managed conservatively. Transcatheter arterial embolization is therapy of choice. The 3–5-week duration of occlusion obtained with Gelfoam allows for collateral circulation from pelvic arteries. This has the advantage of preservation of fertility & resumption of menstruation. Several agents are used, including coils, polyvinyl alcohol particles, gelatin sponges, microspheres, and isobutyl 2-cyanoacrylate. In a pregnant patient, conservative management is opted for.

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