Rupture of renal artery aneurysms in pregnancy

Introduction

We present a case of a 35-year-old female who presented at ten weeks gestation with lower abdominal and right flank pain and gross haematuria. A preoperative diagnosis of ruptured right renal artery aneurysm was made with colour Doppler ultrasound and is the first reported case in a pregnant female.

The high maternal and fetal mortality of ruptured renal artery aneurysm in pregnancy can partly be attributed to an incorrect preoperative diagnosis. In only one reported case was a diagnosis made preoperatively using computer tomography (CT) scanning. Most of the patients were managed as obstetric emergencies with abruptio placenta being the commonest preoperative diagnosis. In addition, hypertension and haematuria during pregnancy add to the diagnostic dilemma. Recent advances in ultrasound technology have meant that colour Doppler ultrasound can now be used as a quick non-invasive method for assessing the kidneys, renal arteries and retroperitoneal spaces.

Case report

A 35-year-old African female, gravida IV, para III, was referred by a general practitioner with a two week history of lower abdominal pain, and frank haematuria. The patient was 10 weeks pregnant. There was no significant past medical history and her previous pregnancies were all normal.

Examination revealed a blood pressure of 150/100 mmHg and a pulse of 82 beats/min. The patient had suprapubic and right flank pain on palpation of the abdomen. A bruit was audible on auscultation of the epigastrium. Catheterisation of the bladder demonstrated frank haematuria with clots. Haemoglobin was 8.4 g/dl and haematocrit was 24.3%. An emergency ultrasound examination demonstrated a normal, viable intrauterine pregnancy and blood clots were noted in the bladder. The left kidney was normal. Examination of the right kidney demonstrated a large 7.3 cm by 5.6 cm hypoechoic lesion in the lower pole (Figure 1a). Colour Doppler and duplex Doppler demonstrated extensive blood flow within the lesion (Figure 1b). A diagnosis of right renal artery aneurysm was made and arrangements were made to perform an emergency angiogram. The patient was counselled and agreed to
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have a termination of pregnancy. At angiography, a large saccular aneurysm arising from the lower primary division was detected (Figure 2). There did not appear to be any other feeding vessels. In addition, a fistula tract into the right renal vein was noted.

An attempt was made to embolise the feeding artery after discussion with the vascular surgeon. This however, was unsuccessful as the diameter of the artery proved to be much larger than the diameter of the endovascular coil. The coil entered the inferior vena cava via the arteriovenous fistula and lodged in the right lung. The patient was taken to theatre where a right eleventh rib resection was performed and the kidney and its vascular pedicle were explored. The feeding artery was mobilised and ligated with silk suture and this resulted in collapse of the aneurysm and disappearance of the bruit. The postoperative period and recovery were uneventful.

The patient had a termination of the pregnancy and a follow-up angiogram performed two weeks later demonstrated no evidence of the aneurysm or arteriovenous fistula.

Discussion

Incidence

The true incidence of renal artery aneurysms is still unknown. The incidence based on autopsy studies is 0.01%. However, angiographic studies suggest a much higher incidence (9.7%). In addition, Harrison et al reported that 1.5% of all potential kidney donors who underwent angiographic evaluation had renal artery aneurysms. Only 24 cases of renal artery aneurysm rupture have been reported in pregnancy (Table I) and a further three cases have been diagnosed post partum.

Aetiology

The formation and rupture of a renal artery aneurysm in pregnancy is still not fully understood, but is thought to be multifactorial. The aneurysm may be classified either as true or false. True aneurysms may be congenital or acquired and are either saccular or fusiform. False aneurysms usually arise secondary to trauma. The combination of hormonal and haemodynamic changes that occur during pregnancy are considered to play a major role in the development and rupture of renal artery aneurysms in pregnancy.

Wexler has described the various changes that occur in the arterial wall of breeder rats during successive pregnancies and Manalo-Estrella and Baker have documented connective tissue changes in the aortic media of pregnant females in 16 autopsy specimens. Intimal thickening has also been seen in the arteries of rats treated with synthetic steroids.

Histopathological examinations were conducted on 12 of the 24 cases of renal artery aneurysm that ruptured during pregnancy. Atherosclerosis was demonstrated in three cases, fibromuscular dysplasia in three cases and neurofibromatosis in one case (Table I). In five cases no specific changes of atherosclerosis or fibromuscular dysplasia were seen. These findings are in contrast to Lacombe’s study where 90% of his 123 patients operated for renal artery aneurysms had evidence of fibromuscular dysplasia. The haemodynamic factors include an increased cardiac output and hence increased renal blood flow that occurs during pregnancy and compression of the aorta by the gravid uterus.

Patient profile and clinical presentation

Review of the 24 previously published cases indicates that there is no relationship between maternal age or parity and the formation and rupture of a renal artery aneurysm in pregnancy. Only one of the patients was being managed for essential hypertension prior to her pregnancy and none of the other patients had any significant medical history.
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This is the second reported case of rupture in the first trimester of pregnancy and there appears to be no correlation between fetal gestational age and rupture in this review.

Patients with unruptured renal artery aneurysms are usually asymptomatic. Abdominal bruits, murmurs or abnormal pulsations may occasionally be detected. Calcification is noted in 30 to 40% of saccular aneurysms and may be detected on abdominal x-ray. In the presence of a rupture however, acute abdominal and unilateral flank pain together with hypovolaemic shock, appear to be the commonest presenting symptoms. It is interesting to note that gross haematuria, indicating rupture into the renal pelvis, was the presenting symptom in only two other cases.

Diagnosis

The preoperative diagnosis of a ruptured renal artery aneurysm was made in only one of the 24 previously reported cases. The presence of haemorrhagic shock in the pregnant patient is usually presumed to be due to an obstetric cause such as an ectopic pregnancy, abruptio placenta and ruptured uterus. This is confirmed by the fact that abruptio placenta was the commonest preoperative diagnosis in the cases reviewed.

Rupture of a splenic artery aneurysm and rupture of a thoracic aorta aneurysm may also present with spontaneous retroperitoneal and intra-abdominal bleeding and mimic an obstetric emergency.

The use of pulsed Doppler and colour Doppler ultrasound to diagnose renal artery aneurysms is well documented. Colour Doppler ultrasound provides a quick non-invasive method of assessing the kidneys, renal arteries and retroperitoneal spaces and should be used more routinely in the pregnant female who presents in haemorrhagic shock.

Treatment

Because of the late diagnosis of rupture in the antepartum period, 10 nephrectomies were performed in the 24 cases we reviewed. In only four cases was repair of the renal artery performed.

| Case no | Authors | Year published | Preoperative diagnosis | Histology |
|---------|---------|----------------|------------------------|-----------|
| 1       | Chisholm AE | 1926           | abruptio placenta      | none      |
| 2       | Ostling K  | 1938           | not stated             | non specific |
| 3       | Lennie & Sheehan | 1942 | not stated             | atherosclerosis |
| 4       | Lennie & Sheehan | 1942 | not stated             | none      |
| 5       | Low DM  | 1944           | ruptured uterus        | none      |
| 6       | Kenny & Doniach | 1945 | not stated             | none      |
| 7       | Zumbo et al | 1952           | abruptio placenta      | none      |
| 8       | Hack RW | 1953           | left pyelonephritis    | atherosclerosis |
| 9       | Ward & Martins | 1955 | not stated             | none      |
| 10      | Burt RL et al | 1956 | not stated             | atherosclerosis |
| 11      | Tapp & Hickling | 1968 | ruptured aortic artery aneurysm | neurofibromatosis |
| 12      | Thomas & Gillis | 1970 | ruptured uterine artery | none      |
| 13      | Cohen SG et al | 1972 | not stated             | non specific |
| 14      | Patterson WM  | 1973           | abruptio placenta      | non specific |
| 15      | Saleh & McLead | 1977 | not stated             | fibromuscular |
| 16      | Love WK et al | 1981           | abruptio placenta      | none      |
| 17      | Barrett JM et al | 1981 | ruptured renal artery aneurysm | non specific |
| 18      | Hidal H et al | 1985           | ectopic pregnancy      | fibromuscular |
| 19      | Cohen & Shamash | 1987 | not stated             | none stated |
| 20      | Schoon IM et al | 1988 | abruptio placenta      | none      |
| 21      | Dayton B et al | 1990 | ruptured Rt renal artery aneurysm | non stated |
| 22      | Murakami M | 1993           | not stated             | none      |
| 23      | Whiteley MS et al | 1994 | ruptured ectopic pregnancy | none      |
| 24      | Rijbroek A et al | 1994 | not stated             | fibromuscular |
| 25      | Current study | 1997           | ruptured Rt renal artery aneurysm | none      |

The management of an unruptured renal artery aneurysm in pregnancy or in the woman of child-bearing age who may become pregnant is elective surgery because of the increased risk of rupture with potentially fatal consequences. The management differs however, in the nonpregnant patient. Conservative management for calcified renal artery aneurysms less than 1.5 cm in diameter in the asymptomatic, nonhypertensive patient has been...
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recommended. 26,27,28 Indications for surgery include renovascular hypertension, flank pain attributable to the aneurysm, haematuria, aneurysm more than 2 cm in size (with or without calcification), renal infarction and lack of calcification in an aneurysm. 27,29 When elective surgery is performed, kidney sparing procedures are recommended. These would include excision of the aneurysm and primary or patch closure. Autotransplantation and bypass grafting are other options that are available.

Conclusion

Since Chisholm 30 reported the first case of rupture of renal artery aneurysm in pregnancy, 23 other cases have been published. The high maternal and fetal mortality rates have mainly been due to incorrect preoperative diagnosis, with most cases being managed as obstetric emergencies. We have provided the first case in which colour Doppler ultrasound was used to make a preoperative diagnosis and recommend its routine use in assessing the pregnant patient who presents with gross haematuria, acute flank pain and haemorrhagic shock.

References

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