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ORIGINAL ARTICLE

# Pseudoaneurysm of Uterine Artery: A Rare Cause of Secondary Postpartum Hemorrhage

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**Abstract**
*Objectives* Secondary PPH has received little attention. In more than half of cases the etiology is not made out. Vascular abnormalities like pseudoaneurysm and AV malformation are rare but detectable and easily treatable.
*Methods* This is an analysis of five women presenting with severe secondary PPH after the 3rd to 6th week of postpartum. All women were post LSCS with no identifiable cause and referred for further management. They were diagnosed to have pseudoaneurysm by angiography and uterine artery embolisation was done.
*Results* Five women were analysed. Four of them had a pseudoaneurysm and were embolised one woman was hemodynamically unstable and hence taken up for hysterectomy.
*Conclusion* Pseudoaneurysm is an important vascular abnormality especially following LSCS. Uterine artery embolisation is safe and reliable alternative technique and prevents a hysterectomy.

**Keywords** Pseudoaneursym · Uterine artery embolization · Secondary postpartum hemorrhage

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## Introduction

Hemorrhage is still the commonest cause of maternal mortality in India. Primary postpartum hemorrhage is common but secondary PPH is rare. Until now secondary PPH has received very little attention probably because of its low incidence and because it causes more morbidity than mortality. However severe secondary PPH may sometimes become fatal.

The common cause of secondary PPH are retained placenta, endometritis and rarely choriocarcinoma. In a series of 97 cases from Sheffield labeled as secondary PPH there was no satisfactory cause for bleeding in over half [1]. With newer modalities of treatment vascular abnormalities are emerging as causes of PPH namely aneurysm, AV malformation, injured vessel, etc.

Effective primary management includes use of uterotonic agents, uterine curettage and antibiotics. Failure of conservative management call for more radical procedures like hypogastric artery ligation or hysterectomy. Ultrasound and angiography has helped to identify women with vascular anomalies leading to PPH. Uterine artery embolization has been a safe and reliable alternative procedure for PPH that is strongly recommended by various authorities but only when the woman is hemodynamically stable [2].

Secondary PPH beyond the 3rd week post delivery is extremely rare and rarer following LSCS. We had over the past 5 years five women presenting with secondary PPH following LSCS all diagnosed to have pseudoaneurysm and treated by embolization.

## Methods

Our first case of pseudoaneurysm was diagnosed and successfully treated in 2005. Subsequently we have had four more women with identical features. All our women presented following LSCS. The history was typical, late secondary PPH with profuse bouts of bleeding which stopped only to recur at a later date. Treatment with uterotonic agents and D&C had been tried. Due to recurrent bleeding episodes women had been referred to our institution.

Women were subjected to serum $\beta$HCG, vaginal swab if necessary and had an ultrasound to look for retained products.

If no obvious cause was found they were subjected to angiography. Embolization was performed either unilaterally or bilaterally if the diagnosis was pseudoaneurysm. In the last 2 years two women had a pre-operative Doppler which confirmed diagnosis of pseudoaneurysm and treated by embolization (Figs. 1, 2, 3).

The following chart reveals the case summary of the five women.

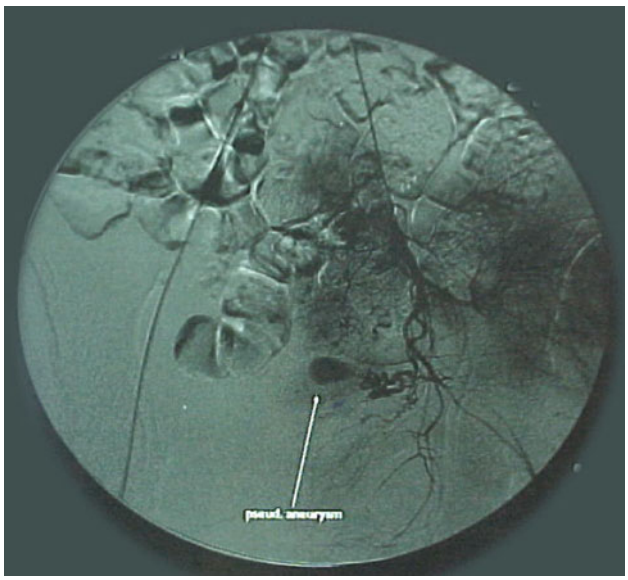


**Fig. 1** Showing pueudoaneurysm

Case Series

| S.no | Age years | Parity | Mode of delivery | Onset of bleeding | No. of episodes | Pre-embolization treatment | Angiographic and USG findings | Embolization unilateral/ bilateral |
|---|---|---|---|---|---|---|---|---|
| 1 | 25 | P2 | LSCS with sterilization | 26th day | 3 in 3 h<br>31st day profuse bleeding | 2 units of blood transfused | Left pseudoaneurysm | Bilateral embolization |
| 2 | 23 | P1 | LSCS | 21st day | 3 in 5 h | 8 units of blood transfusion | Pseudoaneurysm | Resorted to hysterectomy |
| 3 | 22 | P1 | LSCS | 20th day | 4 in 3 h | 2 units of blood transfusion | Left pseudoaneurysm | Bilateral embolization |
| 4 | 26 | P2 | Repeat Emergency LSCS | 40th day | 1 episode on 40th<br>2nd episode on 50th | 2 units of Blood transfusion | Pseudoaneurysm | Unilateral embolisation |
| 5. | 22 | P1 | LSCS | 40th day | 1 episode on 40th<br>2nd episode on 53rd | 2 units of Blood transfusion<br>Check curettage done | Pseudoaneurysm | Unilateral embolisation |

## Results

Out of the five women presenting with severe late PPH four were treated by embolization. One woman was hemodynamically unstable and hence was treated by a hysterectomy.

The age group was between 22 and 26 years. Two women had a repeat emergency LSCS and remaining three had a primary LSCS. Onset of bleeding was between 20th and 24th day in two women and the remaining three between 30th and 40th day. Two of the women had profuse bleeding on 50th and 53rd day and were referred here. Left sided pseudoaneurysm were found in four women and bilateral embolization was performed in two women.

The embolization procedure took one to one and a half hours. The bleeding stopped almost immediately. Only one woman experienced fever, all other women had an uneventful recovery.

## Discussion

Pseudoaneurysm is a well known complication of vascular injury. Pseudoaneurysm is an extra luminal collection of blood with turbulent flow that communicates with flowing arterial blood through a defect in the arterial wall. When the uterine arteries are lacerated or injured and does not

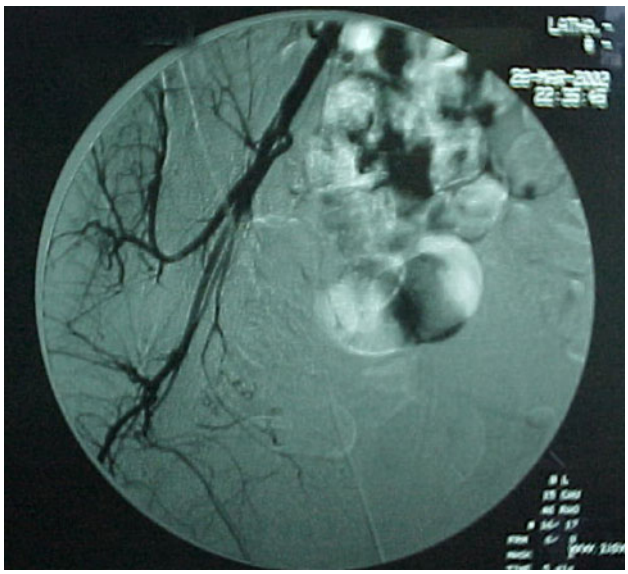

**Fig. 2** Post-embolization status

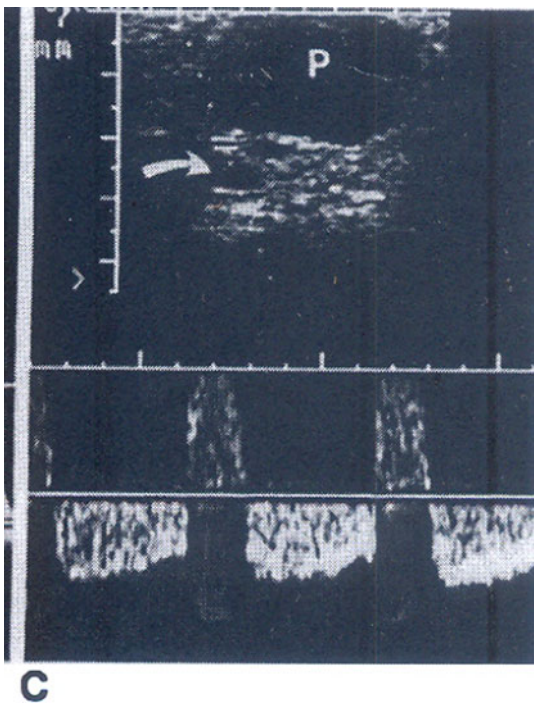


**Fig. 3** Typical "to-and-fro" Doppler wave form

seal completely blood escapes, dissects the adjacent tissue and collects in the perivascular areas. If this collection maintains communication with the parent vessel a pseudoaneurysm can result. Rupture of this can result in profuse bout of bleeding.

Real time sonography provides a simple, reliable, and inexpensive assessment. The sonographic signs consist of expansile pulsations in the pseudoaneurysm and a point of communication with the artery. Pulsed Doppler sonography improves the specificity of diagnosis by allowing demonstration of arterial like and sometimes turbulent flow within the lumen of the false aneurysm. The 'to & fro' Doppler sign is diagnostic of every pseudoaneurysm that has a narrow neck. This can be explained by the fact that during systole the pressure is higher in the artery than in the pseudoaneurysm leading to an influx of blood into the pseudoaneurysm. During diastole the pressure and flow in the artery drop down to zero and there may even be reversal of flow due to high resistance. Blood then flows back through the pseudoaneurysm neck as a result of pressure gradient between the over distended high pressure pseudoaneurysm and low pressure artery. This Doppler sign absorbed at the neck of the pseudoaneurym together with turbulent flow helps to confirm the diagnosis [3].

Pseudoaneurysm of uterine artery after caesarean section—Sonographic diagnosis and treatment has been reported by Henrich et al. [4].

Recently there have been few articles citing pseudoaneurysm of uterine artery after cesarean section as a rare cause of secondary postpartum hemorrhage. Nanjundan has reported a similar case of secondary postpartum haemorrahge on the 19th day after caesarean section and was treated by embolisation [5].

Papa Dasari has reported an identical case on the 19th day after caesarean section treated by bilateral internal artery ligation as facilities for embolisation were not available [6].

Brown et al. [7] reported the first case of selective arterial embolization used successfully to treat an extra uterine pelvic haematoma after three failed surgical attempts.

The success rate following embolization is 97% [8]. There are several advantages:

(1) Exact bleeding site can be identified.
(2) Repeat embolization if necessary could be easily performed.
(3) It does not preclude any hemorrhage control measures.
(4) Avoids general anesthesia.
(5) It is a fertility sparing procedure.

Vedantham states that literature review and clinical experience suggest that embolization should be used before surgical treatment of nonmalignant pelvic bleed in many clinical situations including post-partum, post-cesarean and post-operative bleeding [8].

Fourteen consecutive women with secondary postpartum hemorrhage were treated with selective embolization of the

uterine arteries by Pelage. In all cases, hemostatic embolization was performed because of intractable hemorrhage that could not be controlled with the administration of uterotonic drugs or with uterine curettage [9].

An angiograph helps to identify the site of pseudoaneurysm. Unilateral embolization may suffice but some times if bleeding persists bilateral embolization may be performed due to redistribution from opposite side uterine artery. On our series two women had bilateral uterine artery embolization. Cooper et al. [10] also reports a case of uterine artery pseudoaneurysm presenting as delayed PPH requiring bilateral embolization.

## Conclusion

With newer modalities of treatment available, hysterectomy for PPH should a last resort. Injuries to the vessel is more likely during a Cesarean section which could subsequently give rise to a pseudoaneurysm. Doppler and angiography are useful techniques to diagnose this condition. Selective embolization of an affected vessel could be done and bleeding arrested instantaneously. Being a minimally invasive procedure and causing no risks to mother embolization should be offered whenever and wherever feasible.

Although embolization is becoming the treatment modality of choice for preventing and controlling PPH, its use depends on the availability of interventional radiologists and angiographic equipment. With rapid intervention significant morbidity and mortality associated with PPH can become the thing of the past [11].

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