Bilateral Internal Iliac Artery Ligation in Obstetric Haemorrhage

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Introduction
Severe postpartum haemorrhage (P.P.H) is one of the most common causes of morbidity and mortality related to childbirth. Effective management requires prompt identification of the cause and irration of treatment. Oxytocin and prostaglandins are used but internal iliac artery ligation and caesarean hysterectomy may sometimes be the life saving procedure. Unilateral internal iliac artery ligation was first performed in 1821 for gluteal aneurysm. In gynecological practice it was first used for control of intractable haemorrhage secondary to carcinoma of the cervix.1,2

Internal iliac artery ligation has been used in a life threatening obstetrical, gynaecological or general pelvic haemorrhage. Placenta previa, abruptio placenta with uterine atony, placenta accreta, uterine rupture, cervical or vaginal tear, cervical pregnancy, post hysterectomy haemorrhage are some of the indications for internal iliac artery ligation. Prophylactic ligation to reduce blood loss has been used in radical procedures as in Wertheim hysterectomy, radical vulvectomy and abdomino-perineal resection of carcinoma of the rectum.3

Internal iliac artery ligation does not produce pelvic ischaemia, it merely converts the high pressure arterial flow in the pelvic arteries into a sluggish venous-like flow, allowing clotting and haemostasis; and successful pregnancies have been reported after the procedure.4

We report here cases of postpartum haemorrhage that had internal iliac artery ligation with or without caesarean hysterectomy, as a life saving procedure.

Patients and Methods
Table 1 shows the characteristics of our patients' age, parity, duration of pregnancy, method of delivery, time before ligation was performed, outcome whether alive or stillborn, infants weight, placenta accreta, uterine rupture, cervical or vaginal tear, cervical pregnancy, post hysterectomy haemorrhage are some of the indications for internal iliac artery ligation. Prophylactic ligation to reduce blood loss has been used in radical procedures as in Wertheim hysterectomy, radical vulvectomy and abdomino-perineal resection of carcinoma of the rectum.3

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Isolated. Bilateral internal iliac artery ligation (BILIAL) was performed through the transperitoneal route with direct access to the internal iliac artery.

**Procedure**
The abdomen was opened through the standard approach. The abdominal contents are packed and held back while the uterus held medially exposing the anatomy at the pelvic brim. Through the peritoneum the ureter is identified as it crosses the common iliac artery. The common iliac artery is followed downwards and laterally to identify the external iliac artery, medial to the psoas muscle, and the internal iliac artery. The peritoneum is incised longitudinally and the ureter carefully dissected and lifted up with a fine ureteric catheter or silk to give a view of the external and internal iliac arteries and to keep it under vision all the time. The internal iliac artery is carefully dissected and separated from the friable internal iliac vein. The artery is then ligated on the points of a curved artery forceps. No. 0 silk ligature is picked up by the forceps and double ligation of the artery is carried out without division.

The procedure is repeated on the other side.

**Result**
During the period 1985-1992 fourteen patients under went bilateral internal iliac artery ligation in Madina Maternity Hospital, Kingdom of Saudi Arabia and Soha University Hospital, Kharoum, Sudan. Six patients had ruptured uterus, five due to neglected obstructed labour while the sixth followed previous two Caesarean section scars. One patient had post partum haemorrhage due to placenta accreta. And seven patients had post partum uterine atony as a cause for their post partum haemorrhage. Four of the six patients who had ruptured uteruses were successfully treated with repair of the rupture and bilateral internal iliac artery ligation, two of them had bilateral tubal ligation. However the other two required a Caesarean hysterectomy to control the bleeding.

The patient with post partum haemorrhage due to placenta accreta had a previous Caesarean section scar; she eventually had hysterectomy after internal iliac artery ligation. Only one patient of the seven subjects who had uterine atony required Caesarean hysterectomy after internal iliac artery ligation. However this patient had a forceps delivery and a vaginal tear was noted following the delivery which was successfully repaired, her uterus continued to contract and relax after ergometrine and continuous syntomic infusion. Post partum haemorrhage continued and she had to have Caesarean

hysterectomy. 3500 ml of blood were transfused, she developed wound sepsis and a high temperature post operative which was successfully treated with a combination of metronidazole, gentamicin and ampicillin, eventually the patient was discharged on the 15th post operative day in good condition. Bilateral internal iliac artery ligation was successful in treating the other six patients with atomic post partum hemorrhage.

All subjects received antibiotics and liberal blood transfusion (2000-3500 ml). Two patients developed wound sepsis; both had Caesarean hysterectomy after internal iliac artery ligation. Two subjects developed urinary tract infection. All complications were treated. There was no maternal mortality or any other complication.

Discussion
Internal iliac artery ligation in post partum hemorrhage was intended to conserve the uterus and thus fertility of patients, albeit sometimes the bleeding may be so severe that Caesarean hysterectomy may be indicated as a life saving alternative. Both transabdominal and retroperitoneal approaches are possible. In the transabdominal approach, the bifurcation of the common iliac artery at the pelvic brim is identified. The overlying peritoneum is incised and the ureter is reflected medially. After identification of the external iliac artery a laby forceps is insinuated deep to the internal iliac artery and subsequently ligated. In the retroperitoneal approach a small incision parallel to the inguinal ligament commencing medial to the superior iliac spine is made. This is less invasive and specially used in patients whose general condition has deteriorated. Both absorbable (catgut) and none absorbable (silk) suture material had been used. Chronic catgut sutures allows recanalization of the artery whereas silk does not. Regardless of whether or not recanalization occurs, adequate blood supply to the pelvic area is maintained through three specific collateral arteries, lumbar-iliolumbar, middle sacral - lateral sacral and superior haemorrhoidal-middle haemorrhoidal arteries, thus preventing ischaemia and tissue necrosis. Bilateral internal iliac artery ligation does not produce pelvic ischaemia, it leads to "a pelvic compartment hypotension" converting a high arterial flow system to that of a low one resembling the venous flow system allowing clotting and haemostasis. Burrell in 1964 measured the systolic and diastolic pressures of the uterine artery and of the distal segment of the internal iliac artery before and after ipsilateral, contralateral and bilateral ligation of the proximal part of the internal iliac artery. He showed that with bilateral ligation.
the blood flow remained at 52% of the pre-ligation rate, the pulse pressure decreased by 85% and the mean pressure by 24%. Unilateral ligation of the internal iliac artery decreased the pulse pressure by 77% ipsilaterally and by 14% contralaterally. All ligation in Bucell study were performed by silk sutures and none showed recanalization of the iliac arteries.

In our study four patients (29%) had Caesarean hysterectomy after internal iliac artery ligation. This is less than Evans and Mc Shane experience where 8 out of 14 (57%) of their patients required a hysterectomy after internal iliac artery ligation.

The immediate formation of collateral circulation on the pelvic wall contributes to failure of control of the bleeding. All our subjects had ligation using silk; thus whether the use of nonabsorbable suture material can delay the development of collateral circulation and thus reduce the need for hysterectomy is a point for further consideration. However Evans et al reported a case of perineal and pelvic ischemia attributable to internal iliac artery ligation. The authors argue that, the pelvic vasculature is so variable that in rare individuals collateral circulation may not be sufficient to allow adequate blood supply after internal iliac artery ligation.

Successful full term pregnancies following internal iliac artery ligation have been reported, no intrauterine growth retardation or pregnancy induced hypertension, were noted.

Fetal and maternal circulation monitored by colour doppler imaging showed no circulatory abnormality in patients who had internal iliac artery ligation.

However Caesarean sections after ligation have shown the continued presence of ligation when a non absorbable suture material was used and repermeability of the arteries was restored with the use of dissolvable materials.

Ligation of the uterine artery with or without the ovarian artery had been used with no effect as the lower uterine segment is supplied by the cervico-vaginal and vaginal arteries; branches of the internal iliac artery. Prostaglandins F2a and its analogues had also been used intramuscularly and intramurally to control post-partum hemorrhage due to uterine atony.

However radiographic arterial immobilization was reported to have a successful rate of 90%.

It was claimed that it was a safe, effective, and relatively rapid procedure as it is applied locally at the site of the hemorrhage allowing preservation of reproductive function without the need for general anesthesia or re-exploration in those patients who had undergone surgery. On the other hand an experienced...
vascular radiologist must be present or on call all the time. In the situation where internal iliac artery ligation and hysterectomy fail to control the bleeding, angiographic immobilization remains the only life saving procedure available.\textsuperscript{10,11,16,19}

Internal iliac artery ligation still remains a simple effective surgical procedure in the management of intractable postpartum hemorrhage when the reproductive function is to be preserved.

**Conclusion**

Bilateral internal iliac artery ligation is successful in controlling severe post partum hemorrhage. It is a simple and saving operation, and an effective alternative in many cases to hysterectomy, thus saving fertility and menstrual function. It is easy to perform with no added morbidity or mortality.

\textsuperscript{110} Yemen Medical Journal, Vol 3, No. 2, April 2000
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