Management of pregnancy in women with previous left ilio-caval stenting

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Background: Ilio-caval stenting now represents the first line treatment for disabling obstructive ilio-caval lesions. Most patients are young women of child-bearing age. We herein report our experience of pregnancy in women who have a history of ilio-caval stenting.

Materials and Methods: From November 1995 to April 2008, 119 patients had ilio-caval stenting for obstructive venous disease in our department. Of these, 62 women were able to become pregnant. When pregnancy occurred, they received preventive treatment with low molecular weight heparin (LMWH) from the 3rd month of pregnancy to 1 month after delivery and had to wear elastic stockings. Patients also had to sleep on their right side if possible. They were followed during the pregnancy by duplex scanning at 3, 6, and 8 months, and then 1 month after delivery.

Results: Eight pregnancies occurred in 6 patients (mean age 26.5 years) who had a patent self-expanding stent (1 patient had 3 pregnancies). They had stenting for May-Thurner disease in 5 patients, for post-deep venous thrombosis (DVT) left common iliac vein occlusion in 1 patient, and during venous thrombectomy in 2 patients. All stents were self-expanding metallic stents located on the left common iliace vein. One patient had unrelated spontaneous abortion after 2 months of pregnancy. No DVT or symptomatic pulmonary embolism occurred during pregnancy, delivery, or during the postpartum period. Four patients needed cesarean delivery and none had hemorrhagic complications. None of the patients had adverse effects from the treatment. Duplex scan showed compression of the stent(s) at 8 months in 4 patients with inflow obstruction in 3 patients. Postpartum duplex-scan showed no remaining stenosis in all patients. No stents had structural damage.

Conclusion: Ilio-caval stent compression can occur during pregnancy but does not lead to structural damage to the self-expanding stents. Despite this, no cases of DVT occurred with preventive LMWH treatment. (J Vasc Surg 2009;50:355-9.)

Although for many years surgery was the best way to reconstruct obstructive lesions on ilio-caval segments, stenting is nowadays the technique of choice.1 It can be used to treat chronic lesions2,3 but also during venous thrombectomy4,5 or thrombolysis6 for acute deep venous thrombosis (DVT). While the long-term results of stenting have been reported,3,5 there are no studies on the evolution of these stents in the venous system and they should be considered as a foreign body that remains in a low-flow circulation.

Regardless of the circumstances, this technique is used on young patients and most of them are women. Pregnancy is thus a possibility in stented patients and it is essential that the consequences of this condition be taken into account. The aim of this study is to report our experience with this condition.

MATERIALS AND METHODS

From November 1995 to April 2008, 119 consecutive patients (median age 42 years, ranging from 16 to 79 years) had ilio-caval stenting for obstructive venous disease in our department. Eighty-nine procedures were performed for chronic disabling symptoms despite accurate medical therapy and 31 during venous thrombectomy for acute DVT involving the ilio-caval segments. All patients had stenting of the common iliace vein with extension of the stent into the inferior vena cava (IVC) and none had stenting under the inguinal ligament.

Ninety-one patients were women and of these 20 women were menopausal and 8 had previously had a hysterectomy. In addition, 1 patient had previously had a tubal ligation. There were, therefore, 62 women capable of becoming pregnant.

Pregnant patients received prophylactic treatment with Enoxeparin (Sanofi-Aventis, Paris, France), a low molecular weight heparin (LMWH), at a dose of 4000 UI subcutaneously a day, from the 3rd month of pregnancy to 1 month after delivery with weekly platelet counts. They also had to wear class II elastic stockings and had to sleep on their right side if possible in order to avoid stent compression. In addition, the LMWH treatment had to be stopped 10 days before elective induction of labor or caesarean section and was replaced with subcutaneous unfractionated heparin.

Follow-up included clinical examination by a vascular surgeon and duplex-scan at 3, 6, and 8 months, and then 1 month after delivery. Duplex scan was performed using a Toshiba Powervision (Toshiba Medical System, Tokyo, Japan) with a 3 MHz curved probe and, after 2006, a Toshiba Aplio XG with a 2-6 MHz curved array probe and...
a 3-9 MHz linear probe. Moreover, radiography of the stent(s) was performed at 1 month after delivery. All patients had to deliver in the obstetric department of Centre Hospitalier Universitaire Nord where they were visited by the vascular surgeon.

RESULTS

To date, 8 patients had a pregnancy after stenting but 2 were excluded. One 24-year-old woman had venous thrombectomy and stenting with a balloon-expandable stent (Palmaz XXL, Cordis, Johnson & Johnson, Warren, NJ) at 5 months of pregnancy. Despite receiving curative anticoagulation, re-thrombosis occurred at 7 months. After delivery, radiography showed that the stent had been completely crushed.7 A Palma procedure was performed and this reconstruction is still patent 7 years and 2 pregnancies later. One had stenting during venous thrombectomy and re-thrombosed 15 days after its deployment. For this reason, she did not follow the protocol because pregnancy occurred on already thrombosed stents.

The 6 remaining patients (8 pregnancies) had a median age of 26.5 years at the onset of pregnancy (range, 22-36) and a history of DVT in 3 patients associated with pulmonary embolism in 2 patients. Two patients had a previous pregnancy before stenting. Stenting was performed for May-Thurner syndrome in 3 patients, for post-thrombotic left common iliac vein thrombosis in 1 patient, and during venous thrombectomy in 2 patients. All stents were self-expanding metallic stents (Wallstent, Boston Scientific-Schneider, Minneapolis, Minn) located on the left iliac vein. Median stent length and diameter were, respectively, 60 mm (range, 40-100 mm) and 16 mm (range, 14-16). Median delay between stenting and the first pregnancy was 33.5 months (range, 14-64). In addition, 2 patients needed iterative stenting for restenosis, respectively, 8 months and 27 months after the initial procedure (20 and 37 months before pregnancy). Four patients were tested for thrombophilia before stenting and a prothrombotic state was found in 2 patients: one factor XII deficit and one protein C deficit. At pregnancy onset, median venous disability score (VDS) was 0 (range, 0-1).

The patient who had 3 pregnancies had unrelated spontaneous abortion 2 months into her second pregnancy (ie, before introduction of the LWMH).

Neither DVT nor symptomatic pulmonary embolism occurred during pregnancy or delivery or during the postpartum period. Four patients needed a cesarean delivery and none had a hemorrhagic complication. None of the patients had adverse effects from the treatment by LMWH.

During pregnancy, all patients had worsening of their clinical status with limb edema requiring elastic stockings (median VDS after the 6th month: 2, range, 1-2). None had limb or perineal varicose veins. At 3 months after delivery, clinical status was the same as before pregnancy in all patients.

All duplex scans were performed as scheduled. At 3 months, they were all normal. At 6 months, two cases of stent compression were found (Fig 1) but were not associated to inflow obstruction. At 8 months, 4 compressions were found, 3 located on the stent(s) (Fig 2) and one on the external iliac vein proximal to the stent (Fig 3, A). In 3 patients this compression was associated with inflow obstruction (decrease of velocity in the common femoral vein with asymmetric flow when compared to the contralateral common femoral vein and disappearance of phasicity (Fig 3, B). These 4 patients received therapeutic doses of LMWH until delivery.

Postpartum duplex scans showed no remaining stenosis (Fig 4) and restoration of normal flow in all patients. No stent had structural damage.

DISCUSSION

Venous thromboembolism (VTE) remains one of the leading causes of maternal death during pregnancy in developed countries.9 It also represents an important cause of morbidity not only during pregnancy but also in the long term.10 The incidence of DVT is more than five times higher during pregnancy than in age-matched non-pregnant females ranging from 18 to 95 events per
100,000 woman-years during pregnancy and from 199 to more than 1900 per 100,000 woman-years during the postpartum period. Increased levels of clotting factors (factor I, II, VII, IX, and X), together with decreased fibrinolysis and reduced levels of the natural anticoagulant, protein S, contribute to this state of hypercoagulability during pregnancy. Venous stasis resulting from pressure of the gravid uterus on the inferior vena cava and decreased venous tone are further predisposing factors present in all pregnant women. In addition, Macklon et al showed that flow velocity decreased and vessel diameter increased in the deep leg veins. At term, the flow velocity of the femoral vein slowed to less than one third of the velocity recorded in the first trimester and subsequently in the postpartum period. DVT occurs more frequently on the left side with more than 90% of DVT in pregnancy occurring on this side.12


Fig 3. External iliac vein compression at 8 months of pregnancy at duplex power (A) and color (B) scan.

Fig 4. Postpartum duplex scan showing no more stent compression.
According to Cockett et al., this is due to an exaggeration of the compressive effect of the right common iliac artery on the left common iliac vein.

Heparin, both unfractionated heparin or LMWH, does not cross the placenta and is a safe anticoagulant choice for the fetus. LMWH was shown to provide effective thromboprophylaxis during pregnancy. Antepartum prophylaxis is recognized as an acceptable option in patients of thrombophilia without prior VTE and in patients with prior unprovoked VTE, or VTE associated with a thrombophilia. Antepartum prophylaxis can be more easily justified in women with higher-risk thrombophilias (antithrombin deficiency, homozygosity for factor V Leiden, or prothrombin gene variant, persistent positivity for antiphospholipid antibodies, or combined thrombophilias) and in those with more than one prior event of VTE. The recommended regimen with LMWH is Enoxaparin (Lovenox; Sanofi-Aventis, Paris, France) 4000 U subcutaneously, Dalteparin (Fragmin; Pharmacia-Upjohn, Peapack, NJ) 5000 U subcutaneously, or Tinzaparin (Innohep; Leo Pharma, St Quentin Yvelines, France) 4500 U subcutaneously every 24 hours (these dosing regimens have not received Food and Drug Administration [FDA] approval for this indication). Thromboprophylaxis should also be discussed regarding the presence of the risk factors for VTE. There are no recommendations for the duration of this prophylaxis.

Stent or external iliac vein compression occurred in 57% of the pregnancies in our experience. One patient had external iliac vein compression just proximal to the stent during her second pregnancy, although there was no compression during the first. In patients with stented iliac veins, stent compression is due to the fetus and is not related to an exaggerated compression by the artery on the vein. Compression is dependent on the position of the fetus, relating mainly to the presence of the head of the fetus in the left part of the pelvis which can directly compress the vein. Moreover, compression can lead to inflow obstruction (3 patients in 4) and can be considered an additional risk factor for DVT.

Due to the low number of patients with ilio-caval stenting, there are no recommendations regarding thromboprophylaxis during pregnancy. Our attitude can be justified in patients with prior DVT or with thrombophilia (3 of our 6 patients) as suggested by the seventh ACCP conference on antithrombotic and thrombolytic therapy. Thromboprophylaxis remains more controversial for patients without a history of DVT or thrombophilia who have been stented for May-Thurner syndrome.

To date, our initial protocol has been modified. Before stenting, women should be informed that pregnancy is possible after stenting but not recommended during the first year while antiplatelet drugs or oral anticoagulants are given and because most of the in-stent restenosis occur during this period. After stenting, women who want to get pregnant should have testing for thrombophilia and a Duplex scan in order to check for restenosis. Once pregnant, a Duplex scan should be performed at 3, 6, and 8 months of pregnancy and at 1 month after delivery. Thromboprophylaxis is performed using LMWH from the 3rd month of pregnancy to 1 month after delivery, but in case of significant compression (with venous obstruction), a therapeutic dose of LMWH should be used. This type of compression almost certainly represents a higher risk of femoro-iliac thrombosis.

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**REFERENCES**


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