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Cervical artery dissection in postpartum women after cesarean and vaginal delivery

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ABSTRACT

Background and aims: Cervical artery dissection (CAD) is an infrequent but potentially disabling and fatal disease, accounting for up to 25 % of strokes in young adults. Pregnancy-related hormonal changes and increased hemodynamic stress on artery walls during vaginal delivery have been associated to CAD. We aim to describe a series of women presenting CAD during postpartum (PP) after cesarean and vaginal delivery.
Methods: CAD women admitted to one hospital in Santiago, Chile, between July 2018 and October 2020 were included in a prospective cohort. Demographic, clinical and imaging data were registered for the PP group.
Results: Sixty-seven women were diagnosed with CAD, from which 10 were PP. Seven women had cesarean section and 3 had vaginal delivery. They presented CAD related symptoms after a median of 10.5 (IQR 5-15) days from delivery. All of them had headache as initial symptom, 9 presented cervical pain and 8 had a family history of stroke. Four patients presented preeclampsia during pregnancy. Acute treatment consisted mostly in antiplatelet agents and analgesics. None of these patients had a CAD related stroke. Demographic, clinical and imaging characteristics of these women with CAD during PP are described.
Conclusions: This case series underpins the importance of clinical suspicion of CAD after delivery, highlighting the fact that CAD is not limited to women with vaginal delivery, thus alternative causes beyond acute hemodynamic stress could be involved. Further research is required to determine genetic components, along with deeper knowledge of modulating factors related to CAD in this setting.

Introduction

Cervical artery dissections (CAD) are a disruption of the vessel wall, defined by the presence of a mural haematoma within the arterial layers.[1] Although its incidence ranges from 1 to 2.6 per 100,000 patients per year,[2] it is a common cause of stroke in young adults, accounting for up to 25% of ischemic strokes in this group.[3,4]

Furthermore, CAD is a leading cause for stroke in women of childbearing age,[5] and 6% of spontaneous CAD in women under 50 years occur during the postpartum period (PP).[6] Recent studies have shown that there is a significant association between pregnancy and hospitalization for CAD particularly in pregnant women with hypertensive disorder,[7] however the mechanisms linking pregnancy and postpartum to CAD remain poorly understood. Moreover, most information comes from European or North American countries, leaving other populations underrepresented.[1] On the other hand, postpartum reports include mostly patients presenting CAD after vaginal delivery.[8] Since vaginal delivery can be considered a traumatic event with profound effects on acute hemodynamics and vascular stress, which could explain CAD, it is important to include cases related to cesarean section and reveal their particular characteristics.

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Therefore, we aimed to characterize PP women with CAD admitted to a hospital in Santiago, Chile and describe their demographic, clinical and imaging characteristics.

Materials and methods

Women in their PP period were identified from a prospective cohort of adult patients with acute CAD.[9] Their demographic, clinical and imaging data were registered. All patients were admitted to a single hospital in Santiago, Chile between July 2018 and October 2020.

CAD patients were suspected clinically by the emergency department neurologist considering local symptoms and signs (unusual headache or neck pain, Horner's syndrome, cranial nerve palsy) or as a finding in the acute imaging of a new onset stroke. Diagnosis was confirmed with neuroimaging by cervico-cranial Computed Tomography Angiography (CTA) or Magnetic Resonance Angiography (MRA) and was defined as the presence of mural hematoma, aneurysmal dilation, long tapering stenosis, intimal flap, double lumen, or occlusion situated >2 cm above the carotid bifurcation revealing an aneurysmal dilation or a long tapering stenosis after recanalization.[10] All patients admitted with CAD with an onset of symptoms of 10 days or less were included in the cohort. Demographic information, previous medical history, acute characteristics and treatment were registered, and 6 months clinical follow-up was performed.

The Local Ethics Committee approved the study registry protocol (Comité Etico Científico, Facultad de Medicina Universidad del Desarrollo) and written informed consent was obtained from all patients.

Results

Sixty-seven women were admitted and diagnosed with CAD between July 2018 and October 2020, from whom 10 were in PP period. PP women presented CAD after a median of 10.5 (IQR 5-15) days from delivery. Three of them had a vaginal partum and 7 had a cesarean section (6 of them were elective cesarean). All PP CAD cases are described in Tables 1 and 2. No patient reported genetic, connective tissue disease, or history of artery dissection. No history of infection during the month before the artery dissection was reported, and 2/10 PP patients referred having received cervical massage or chiropractic procedures during the month before CAD. Regarding cardiovascular risk factors, no patient had previous history of hypertension, diabetes, dyslipidemia, smoking or cardiopathy. Four patients presented with preeclampsia during pregnancy.

Prior to admission, 2 patients used prophylactic anticoagulants during the month before the dissection and 3 were taking antidepressants. In relation to family background, 8/10 patients had a relative with previous stroke and 1 patient had a mother diagnosed with CAD. Two women referred having had a miscarriage in the past. Regarding the symptoms of the CAD, 9 had cervical pain and all of them had headache. One felt pain irradiated to the arm and another patient to her shoulders. Only 1 patient had transient cerebellar symptoms.

Regarding CAD location, 4 women had the dissection in the right vertebral artery and 1 in the left vertebral artery (Table 2). Three patients had bilateral vertebral dissections and 1 patient had a right carotid dissection. This last patient was re-admitted 3 days after hospital discharge because of bilateral vertebral dissection. No patient had a related stroke.

Regarding acute CAD treatment, 3 patients received prophylactic anticoagulants for thromboprofilaxis, 1 received full dose anticoagulation (because of previous history of thrombophilia) and 9 received antiplatelet agents. All of them received analgesics, 3 were on antihypertensives and 4 received hypolipidemic treatment. Only one patient re-

Table 1
Baseline and clinical characteristics of patients presenting with cervical dissection.

	PP women = 10
Mean age (SD)	36.5 (2.4)
Preeclampsia	4
Medical history	
Hypertension	0
Previous miscarriage	2
Diabetes Mellitus	0
Insulin resistance	1
Migraine	2
Dyslipidemia	0
Tobacco use	0
Previous CAD	0
Family history of artery dissection	1
Family history of stroke	8
Most common acute symptoms	
Headache	10
Cervical Pain	9
Acute medical treatment	
Antiplatelet agents	9
Anticoagulation	1
Analgesics	10
Outcome	
Stroke	0

PP: postpartum; CAD: cervical artery dissection

Table 2
Detailed description of postpartum cervical artery dissection cases

	Days from delivery	Delivery mode	Images MRA/CTA	6 months follow up
Patient 1	5	Preterm twin cesarean	Focal dissection of V2 of the right vertebral artery and mural hematoma	mRs of 0, EQ-VAS 85/100
Patient 2	5	Elective cesarean	Focal dissection of V2 of the right vertebral artery, pseudoaneurysm, and fibromuscular dysplasia	mRs of 0, EQ-VAS 80/100
Patient 3	12	Elective cesarean	Bilateral vertebral artery dissection with mural hematomas in both arteries	mRs of 0, EQ-VAS 70/100
Patient 4	9	Emergency cesarean	Right vertebral artery dissection with mural hematoma	Lost to follow up
Patient 5	15	Elective cesarean	Right carotid dissection, with mural hematoma and extensive filiform stenosis. Three days after her first admission, she presented new bilateral vertebral arteries dissections	mRs of 1, EQ-VAS 70/100
Patient 6	5	Elective cesarean	Right vertebral dissection	mRs of 0, EQ-VAS 100/100
Patient 7	12	Elective cesarean	Bilateral dissection of the vertebral arteries, with a pseudoaneurysm in the right artery and a mural hematoma in the left artery	mRs of 0, EQ-VAS 75/100
Patient 8	9	Vaginal partum	Bilateral dissection of the vertebral arteries with mural hematoma and extensive filiform stenosis in both sides	mRs of 0, EQ-VAS 40/100
Patient 9	119	Vaginal partum	Left vertebral artery dissection	mRs of 0, EQ-VAS 100/100
Patient 10	17	Vaginal partum	Right carotid artery dissection plus bilateral vertebral artery dissections 2 days later	mRs of 0, EQ-VAS 70/100

MRA: Magnetic Resonance Angiography; CTA: Computed Tomography Angiography; mRS: modified Rankin Scale; EQ-VAS: EuroQol visual analogue scale

quired a vasoactive agents use to improve cerebral hemodynamic status.

Finally, 9 of these patients attended a follow-up visit 6 months later, in which the median of their own health perception status with the EuroQol visual analogue scale (EQ-VAS) was 80 points (ranges 40-100) and had a modified Rankin Scale (mRS) score of 0 or 1 (Table 2).

Discussion/conclusion

This case series present a comprehensive description of PP CAD admitted to a Chilean hospital, with most women having a recent cesarean delivery.

Consistent with other studies,[6,11,12] headache and cervical pain were the most common symptoms in PP CAD patients. Considering that headache is the most common symptom in PP CAD and also a frequent complain during PP period, a high index of suspicion is required in order to act precisely and on time. Although rare, CAD can have catastrophic consequences to healthy young women.[11] Contrary to previous reports where vaginal delivery has been described as a potential trigger for CAD,[8] in this series of cases more PP women had cesarean section than vaginal delivery. Therefore, clinical suspicion is of particular importance in all PP women with headache and neck pain, including patients after cesarean delivery.

It is thought that patients with CAD have an underlying structural defect of the arterial wall due to a genetic predisposition,[7,13] which could explain the prevalence of family history of stroke in CAD patients, which is particularly high in this report. If there is a particular predisposition to CAD in these patients, it is interesting to note that the CAD occurred after delivery and not during pregnancy. Interestingly, previous reports have showed that pregnancy-related risk of CAD is higher during the postpartum period,[7] and this is consistent with this cohort, where no CAD was diagnosed in women during pregnancy. On top of other physiological changes related to pregnancy - including increased blood volume and cardiac output as well as hormone-mediated changes - the sudden decrease in estradiol and progesterone after delivery may directly affect vessel wall integrity.[11] Further research is required to establish the exact genetic components that can further predispose to CAD.

In the PP group, 4/10 women had preeclampsia. This is consistent with previous articles that have found 45% of the PP patients diagnosed with CAD had a hypertensive disorder during pregnancy.[7] Moreover, it is described that postpartum vertebral artery dissections occur more often when other vascular conditions are present.[13] All these data suggest that hypertensive pathologies in PP women could be a risk factor for CAD.

This study comes from a prospective cohort of patients limited to a single center. Its detailed case description is a strength differentiating it to other larger registries. Moreover, the inclusion of Latin-American patients and post-cesarean CAD can aid in the understanding of this unpredictable disease.

Due to the limited available information in the literature, further research is needed to better understand the complex relation between pregnancy, postpartum, hypertensive syndromes and genetic predisposition with CAD in PP women. This case series highlights the importance of clinical suspicion of CAD after delivery, considering also post-cesarean patients. Patients with family history of stroke and hypertensive syndromes during pregnancy should receive particular attention when presenting with headache. Further research is required to determine genetic components, along with a deeper knowledge of modulating factors related to CAD.

Statements

Ethics Statement: The Local Ethics Committee approved the study registry protocol (Comité Etico Científico, Faculty of Medicine Universidad del Desarrollo) and written informed consent was obtained from all the patients.

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Author Contributions

FU and PMV designed the study, analyzed the data and wrote the first draft. All authors contributed to the acquisition of data, reviewed and critically revised this work.

Data Availability Statement

The study dataset can be made available after request to the corresponding author.

Declaration of Competing Interest

EM and AS report no conflicts of interest regarding this study

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