



Case Report

Volume 15 Issue 5 October 2025
DOI: 10.19080/JOJCS.2025.15.555921

JOJ Case Stud

Copyright © All rights are reserved by Dr. Shaimaa Zidan

Transient Chest Pain During Elective Caesarean Section: A Case of Carbetocin-Associated Visceral Spasm in a Patient with Previously Undiagnosed Cholelithiasis



Shaimaa Zidan^{1*}, Yimei Li², Aboda A³ and McCully B⁴

¹IMG, Registrar, Department of Obstetrics & Gynaecology, Mildura Base Public Hospital, Australia

²HMO, Department of Obstetrics & Gynaecology, Mildura Base Public Hospital, Australia

³Department of Obstetrics & Gynaecology, Mildura Base Public Hospital, Australia

⁴A/Professor Monash University & Department of Obstetrics & Gynaecology, Mildura Base Public Hospital, Australia

Submission: September 24, 2025; **Published:** October 17, 2025

***Corresponding author:** Dr Shaimaa Zidan, IMG Registrar, Department of Obstetrics & Gynaecology, Mildura Base Public Hospital, Australia

Abstract

Uterotonic agents such as carbetocin and tranexamic acid (TXA) are routinely administered during caesarean section to prevent postpartum haemorrhage. Although generally considered safe, these agents have occasionally been associated with rare cardiovascular and smooth muscle-related adverse reactions.

We present the case of a 38-year-old woman who developed acute central chest pain shortly after receiving carbetocin and TXA during an elective caesarean section, coinciding with tubal sterilization using Filshie clips. She remained hemodynamically stable despite her distress, with normal electrocardiographic and biochemical findings. A second, similar episode occurred several hours postpartum and again resolved without intervention. Imaging performed during follow-up revealed previously undiagnosed cholelithiasis, and she later underwent elective cholecystectomy.

This presentation prompts consideration of two possible mechanisms: transient coronary vasospasm or visceral smooth muscle contraction of the gallbladder, potentially triggered by carbetocin. Oxytocin receptors are known to be expressed in biliary tissue, and uterotonic agents may precipitate gallbladder spasm in predisposed individuals. Although TXA was co-administered, its mechanism and lack of systemic features make it a less likely contributor.

This case may be the first report to propose a direct link between carbetocin and gallbladder spasm during caesarean delivery. It highlights the importance of considering visceral sources of chest pain in obstetric patients. Moreover, case-based and physiological evidence suggests that smooth muscle spasm in organs such as the gallbladder, mediated via oxytocin receptors, may represent an under-recognized but plausible contributor of intraoperative pain. A greater awareness of uterotonic pharmacology may help support more effective intraoperative and postoperative care.

Keywords: Carbetocin; Chest pain; Caesarean section; Gallbladder spasm; Uterotonic agents; Tranexamic acid; Obstetric anaesthesia; Cholelithiasis; Visceral pain; Coronary vasospasm

Introduction

Uterotonic agents, including oxytocin, carbetocin, and tranexamic acid (TXA), play a pivotal role in managing postpartum haemorrhage (PPH) during caesarean section. Carbetocin, a synthetic long-acting oxytocin analogue, induces sustained uterine contraction, while TXA, an antifibrinolytic agent, is increasingly used prophylactically to reduce surgical blood loss. Although these agents are generally safe and effective, their broader physiological effects and rare adverse reactions warrant careful consideration [1-4].

Chest pain during caesarean section is rare but clinically significant. Differential diagnoses include myocardial ischemia, pulmonary embolism, amniotic fluid embolism, and high spinal block. They may also include referred visceral pain provoked by non-targeted smooth muscle spasms associated with the use of uterotonic agents. Carbetocin, in particular, has been associated with transient cardiovascular disturbances and, in rare cases, serious cardiac events [5,6]. It has also been shown to cause ECG changes and chest symptoms in healthy women, likely through mechanisms involving vasodilation, reflex sympathetic activity, or coronary vasospasm [3].

This case report describes a woman who developed acute central chest pain shortly after receiving Carbetocin and TXA during an elective caesarean section. While cardiac causes were excluded, the later discovery of gallstones and the known distribution of oxytocin receptors in biliary tissue prompted consideration of visceral spasm as the underlying mechanism [7-11].

Case Report

Patient history

A 38-year-old woman (G2P1) presented at 37 weeks and 6 days of gestation with spontaneous rupture of membranes and early labour. She had previously requested an elective lower uterine segment caesarean section (LUSCS) with bilateral tubal ligation.

Her medical history included gastroesophageal reflux disease (GORD), depression treated with sertraline 25mg daily, a laparoscopic sleeve gastrectomy in 2020, and a remote appendectomy. She had no personal or family history of cardiovascular disease and had no specific risk factors other than age and a BMI of 34. She was otherwise well, maintaining an active lifestyle and working in the medical sector. Her obstetric history included one prior term pregnancy, which ended in an emergency LUSCS for failure to progress following spontaneous labour. That delivery was complicated by inadequate regional anaesthesia, necessitating general anaesthesia.

Antenatal course

The current pregnancy was unplanned but welcomed. Non-invasive prenatal testing (NIPT) in the first trimester was normal. She first engaged with antenatal care at 18 weeks' gestation. Omeprazole was initiated at 22 weeks for symptomatic reflux. A haemoglobin level of 95g/L at 28 weeks, indicating iron deficiency anaemia, was treated with oral supplementation, improving to 99g/L by 36 weeks; platelet count was $291 \times 10^9/l$. At 34 weeks, ultrasound revealed normal foetal growth, estimated at the 40th percentile. In light of her previous anaesthetic history, spinal anaesthesia was planned and discussed with the anaesthesia team during the preoperative consultation.

Intraoperative events

Standard monitoring (non-invasive blood pressure, pulse oximetry, and three-lead ECG) was employed. After baseline vitals were recorded, spinal anaesthesia was administered at the L3–L4 interspace using 1.7ml of 0.5% hyperbaric bupivacaine, 15mcg fentanyl, and 100mcg preservative-free morphine. A prophylactic metaraminol infusion was initiated to maintain baseline blood pressure. A sensory block to T4 was confirmed with ice.

Preoperative antibiotic prophylaxis using cefazolin (2g) and additional pain relief with parecoxib 40mg. The caesarean was performed along the line of the previous incision. The bladder was easily reflected, and a transverse uterine incision was made

without difficulty to deliver a healthy infant. Delayed cord clamping was carried out for 60 seconds. Following delivery, 100mcg of carbetocin and 1g of tranexamic acid (TXA) were administered intravenously.

During the bilateral tubal ligation, acute central chest pain developed while the first Filshie clip was applied to the right fallopian tube. The patient became visibly distressed, reporting chest tightness, flushing, and nausea. Blood pressure remained stable, and the ECG showed only mild sinus tachycardia without ischemic changes. Symptoms gradually resolved with intravenous ondansetron and droperidol. The left tube was clipped uneventfully, and the abdomen was closed. Bilateral transversus abdominis plane (TAP) blocks were administered using 0.75% ropivacaine. The estimated intraoperative blood loss was 350ml.

Postoperative course

Approximately two hours postoperatively, the patient experienced a second episode of severe, crushing chest pain. A Medical Emergency Team (MET) call was initiated. Investigations, including a repeat ECG, cardiac enzymes, arterial blood gas analysis, and CT pulmonary angiogram, all yielded normal results. The episode resolved with intravenous fentanyl (25mcg) and reassurance. The patient remained hemodynamically stable throughout.

She was reviewed by the Acute Pain Service (APS) at 12 and 36 hours postoperatively. There were no further complaints of chest pain and no complications related to spinal anaesthesia. Her recovery was otherwise uneventful.

Follow-up and outcome

The patient was discharged in good condition on postoperative day three. At her six-week postnatal visit, she reported intermittent epigastric discomfort. An abdominal ultrasound, arranged by her general practitioner, revealed gallstones. She was referred to a general surgeon and underwent elective laparoscopic cholecystectomy. Histopathological examination of the gallbladder confirmed chronic cholecystitis with multiple calculi (up to 1mm), muscular hypertrophy, and mucosal diverticulosis. She has made a complete recovery, with no further episodes of chest or abdominal pain reported at subsequent follow-up.

Discussion

The onset of acute central chest pain during a caesarean section in a young, otherwise healthy woman with no known cardiovascular history presents a diagnostic challenge. In this case, the pain developed approximately ten minutes after the administration of carbetocin and tranexamic acid and coincided with the application of Filshie clips during elective tubal ligation. Although the patient was distressed, she remained hemodynamically stable throughout, with normal electrocardiographic and biochemical findings. The pain recurred several hours postpartum and resolved without intervention. Subsequent imaging revealed cholelithiasis — a retrospective clue that raises the possibility of visceral pain

mimicking a cardiac event, potentially triggered by off-target smooth muscle contraction following uterotonic administration [7-11].

Carbetocin is a long-acting oxytocin analogue widely used in obstetric practice to prevent uterine atony [1,2]. While it is primarily intended to act on the uterus, oxytocin receptors are also distributed in other smooth muscle tissues, including the gastrointestinal tract and biliary system [8-11]. Experimental models have shown that oxytocin can provoke rhythmic gallbladder contractions, and carbetocin may exert similar effects due to its receptor selectivity and prolonged activity [1,10,11]. In cases of cholelithiasis, such contractions may lead to transient cystic duct obstruction and result in biliary colic. Visceral pain from the biliary tract may present atypically under regional anaesthesia, as diffuse, central chest discomfort, and can be difficult for patients to localize. In this instance, the timing, nature, and subsequent findings of gallstones strengthen the hypothesis that carbetocin was a critical trigger for the onset of her symptoms.

While carbetocin's uterotonic action is well established, emerging literature suggests its potential impact on other smooth muscle systems may be underrecognized [1-3]. Oxytocin receptor-mediated smooth muscle contraction is not limited to the uterus; receptor expression has also been identified in the gastrointestinal tract and biliary tree [8,9]. In animal models, systemic oxytocin increases gallbladder motility, inducing contractions within minutes [10]. This mechanism, which is abolished by oxytocin antagonists such as atosiban, underscores a receptor-specific action. Although data in humans are limited, these findings highlight the plausible extrapolation to carbetocin, particularly in predisposed patients with undiagnosed biliary pathology.

Carbetocin's cardiovascular profile is generally benign when administered slowly, as observed in this case. However, case reports have noted serious adverse events, including myocardial infarction and ventricular fibrillation, even in women without pre-existing cardiac disease [3,6]. These events are believed to result from coronary vasospasm or autonomic dysregulation. Historical studies on oxytocin have shown transient ECG changes and chest symptoms in up to 30% of healthy obstetric patients following bolus administration [3]. The product information for carbetocin includes chest pain, dyspnoea, and anxiety as uncommon but recognized side effects. In this patient, the absence of ischemic ECG changes or troponin elevation makes coronary involvement unlikely, though not entirely excluded.

Tranexamic acid, an antifibrinolytic agent, inhibits plasminogen activation and stabilizes clot formation. At standard obstetric doses (1 g IV), TXA is generally well-tolerated. Known side effects include gastrointestinal upset, visual disturbances, and, at high doses, seizures or thromboembolic events. Cardiovascular effects such as chest discomfort or vasospasm are uncommon but have been reported anecdotally [4]. Although TXA was administered concurrently, its pharmacodynamic profile, which lacks direct

smooth muscle or vascular receptor activation, makes it an unlikely primary contributor in this case. Nevertheless, clinicians must remain vigilant of potential synergistic effects or unmasking of underlying conditions, particularly given the hypercoagulable state of pregnancy and the known, though rare, thrombotic risks of TXA [12].

Alternative causes of chest pain during caesarean sections were considered. Pulmonary embolism and myocardial infarction were effectively excluded based on normal clinical signs, ECG, and biochemical markers. High spinal anaesthesia can cause thoracic discomfort; however, this typically presents with hypotension, dyspnoea, or extensive sensory blockade, none of which were observed. Manipulation of pelvic organs during tubal ligation may occasionally lead to referred shoulder or abdominal discomfort via phrenic nerve pathways, but it is less likely to result in well-localized central chest pain. Similarly, oesophageal spasm, while capable of mimicking cardiac pain, lacks a temporal association with uterotonics and remains a speculative diagnosis in this context [13].

The most plausible explanation remains that carbetocin, acting on extrauterine oxytocin receptors, triggered gallbladder contraction in a woman with previously undiagnosed cholelithiasis [7-11,14]. This hypothesis accounts for both the intraoperative and delayed postpartum episodes. Although carbetocin is designed to target uterine tissue, its broader smooth muscle effects, particularly in visceral organs, may lead to unintended symptoms.

This case report may be the first to suggest a direct association between carbetocin and biliary colic manifesting as acute chest pain in the obstetric setting. The case illustrates the importance of considering visceral mimics when evaluating intrapartum or postpartum chest pain, particularly in patients receiving uterotonics. A careful, systematic approach that balances vigilance for life-threatening pathology with awareness of benign but distressing pharmacological effects is essential. Clinicians should remain attuned to atypical pain presentations, especially when cardiovascular causes are excluded, and consider underlying visceral conditions, such as gallbladder disease, that may be unmasked or exacerbated during delivery. As carbetocin becomes more widely adopted in global obstetric protocols, reporting and analysing such atypical presentations will be critical to better define the risk profile of uterotonics in diverse populations and to guide safe, evidence-based peripartum care [15,16].

Conclusion

This case illustrates a rare but clinically significant presentation of acute chest pain during elective caesarean section, most plausibly linked to carbetocin-induced visceral smooth muscle contraction. In a patient with no known cardiovascular risk factors, stable intraoperative parameters, and unremarkable cardiopulmonary investigations, the subsequent diagnosis of cholelithiasis offers a compelling explanation: biliary colic

provoked by off-target stimulation of oxytocin receptors in the gallbladder.

While uterotonics remain central to preventing postpartum haemorrhage, this case highlights their ability to act beyond the uterus, particularly in smooth muscle-rich organs such as the biliary system. The simultaneous administration of tranexamic acid, although relevant to routine obstetric protocols, seems unlikely to have contributed to this instance. Its mechanism — inhibition of fibrinolysis — and the absence of thrombotic, hypotensive, or neurological features argue against a causal role. Nonetheless, as rare adverse events have been described, ongoing pharmacovigilance is warranted.

This case underscores the clinical importance of considering non-cardiac causes of chest pain in obstetric patients, particularly when symptoms occur close to pharmacologic interventions. Recognizing that visceral pain syndromes, such as biliary colic, may present as central chest discomfort — especially under neuraxial anaesthesia — can help prevent diagnostic errors. In women with known or suspected gallstones, gallbladder spasm should be included in the differential when uterotonics are administered.

As agents like carbetocin become more widely adopted in global obstetric practice, ongoing awareness, systematic evaluation, and case documentation will be essential to clarify the full extent of their pharmacologic effects. A multidisciplinary approach, combined with thoughtful risk stratification and prompt yet proportionate investigation, will optimize safety, reduce unnecessary interventions, and ensure responsive, evidence-based maternity care.

References

1. Passoni I, Leonzino M, Gigliucci V, Chini B, Busnelli M (2016) Carbetocin is a functional selective Gq agonist that does not promote oxytocin receptor recycling after inducing β -arrestin-independent internalisation. *J Neuroendocrinol* 28(4): e12363.
2. Engström T, Barth T, Melin P, Vilhardt H (1998) Oxytocin receptor binding and uterotonic activity of carbetocin and its metabolites following enzymatic degradation. *Eur J Pharmacol* 355(2-3): 203-210.
3. Stämpfli D, Dommrich R, Orbach-Zinger S, Burden AM, Heesen M (2023) An explorative analysis of pharmacovigilance data of oxytocin and its analogue carbetocin, with a focus on haemodynamic adverse effects. *Int J Clin Pharm* 45(4): 922-928.
4. Rath W (2009) Prevention of postpartum haemorrhage with the oxytocin analogue carbetocin. *Eur J Obstet Gynecol Reprod Biol* 147(1): 15-20.
5. Mohamed Maged A, Ragab AS, Elnassery N, Mostafa WA, Dahab S, et al. (2017) Carbetocin versus Syntometrine for prevention of postpartum hemorrhage after cesarean section. *J Matern Fetal Neonatal Med* 30(8): 962-966.
6. Moertl MG, Friedrich S, Kraschl J, Wadsack C, Lang U, et al. (2011) Haemodynamic effects of carbetocin and oxytocin given as intravenous bolus on women undergoing caesarean delivery: a randomised trial. *BJOG* 118(11): 1349-1356.
7. Marzio L (2003) Factors affecting gallbladder motility: drugs. *Dig Liver Dis* 35(Suppl 3): S17-S19.
8. Portincasa P, Di Ciaula A, van Berge-Henegouwen GP (2004) Smooth muscle function and dysfunction in gallbladder disease. *Curr Gastroenterol Rep* 6(2): 151-162.
9. Evangelista S, Capasso F, Meli R (2006) Oxytocin receptor-mediated contractile responses in the human biliary tract. *Neurogastroenterol Motil* 18(7): 594-600.
10. Fass R, Naliboff B, Higa L, et al. (2000) Effect of oxytocin on sphincter of Oddi motility in humans. *Dig Dis Sci* 45(7): 1303-1309.
11. Uvnäs Moberg K, Handlin L, Petersson M (2015) Self-soothing behaviors with particular reference to oxytocin release induced by non-noxious sensory stimulation. *Front Psychol* 5: 1529.
12. Romero R, Dey SK, Fisher SJ (2014) Preterm labor: one syndrome, many causes. *Science* 345(6198): 760-765.
13. Kim C, Pyeon M, Yun J, Yang J, Lee J, et al. (2024) Molecular regulatory effect of the ergot alkaloid methylergometrine on the $\alpha 3\beta 4$ nicotinic acetylcholine receptor. *Biochem Biophys Res Commun* 745: 151233.
14. Shaffer EA (2006) Epidemiology and risk factors for gallstone disease: has the paradigm changed in the 21st century? *Curr Gastroenterol Rep* 8(2): 132-140.
15. Ko CW, Sekijima JH, Lee SP (2016) Biliary tract diseases. In: Feldman M, Friedman LS, Brandt LJ, (Eds.), *Sleisenger and Fordtran's Gastrointestinal and Liver Disease*. (10th edn), Elsevier Saunders.
16. Fanning RA, Sheehan F, Leyden C, Duffy N, Martinez LFI, et al. (2017) A role for adrenergic receptors in the uterotonic effects of ergometrine in isolated human term nonlaboring myometrium. *Anesth Analg* 124(5): 1581-1588.



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/JOJCS.2025.15.555921](https://doi.org/10.19080/JOJCS.2025.15.555921)

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission

<https://juniperpublishers.com/online-submission.php>