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## Case report

# Left anterior descending coronary artery spasm and “accordion effect” mimicking coronary artery dissection

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## ARTICLE INFO

## Article history:

Received 1 March 2014

Accepted 7 October 2014

Available online 29 October 2014

## Keywords:

Coronary artery spasm

Accordion phenomenon

Percutaneous coronary intervention

## ABSTRACT

We present an illustrative case report of the mid-vessel left anterior descending (LAD) coronary artery spasm, which has been enhanced by straightening of the tortuous LAD segment with a guidewire (“accordion effect”) thus resistant to intracoronary nitroglycerine and mimicking a coronary artery dissection. Dynamic appearance of this iatrogenic pseudo-lesion upon administration of intracoronary nitrates and recognition of these angiographic phenomena prevented from unnecessary further intervention.

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## 1. Introduction

Each coronary intervention carries a potential risk of iatrogenic complications in adjunction to expected benefit if effective percutaneous myocardial revascularization is achieved. It is important to foresee and recognize potential complications and be alert of their management. Ambiguous situations when one complication is mimicking another are encountered in clinical practice [1,2]. Such situations may be challenging in cases when different management strategies are applicable to treat these complications. We present an illustrative case report of a tortuous left anterior descending

(LAD) coronary artery spasm and intimal infolding distally to the target lesion resistant to intracoronary nitroglycerine and resembling coronary artery dissection, which resolved with removal of guidewire.

## 2. Case report

A 67-year-old woman presented with non-ST segment elevation anterior myocardial infarction with recurrent anginal chest pain on minimal exertion, and subsequently underwent urgent coronary angiography which revealed non obstructed right coronary artery, short left main stem with nearly

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Peer review under responsibility of Lithuanian University of Health Sciences.



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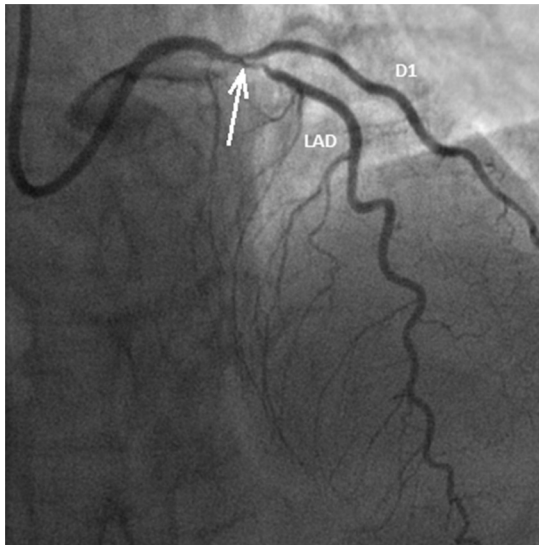
<http://dx.doi.org/10.1016/j.medici.2014.10.004>

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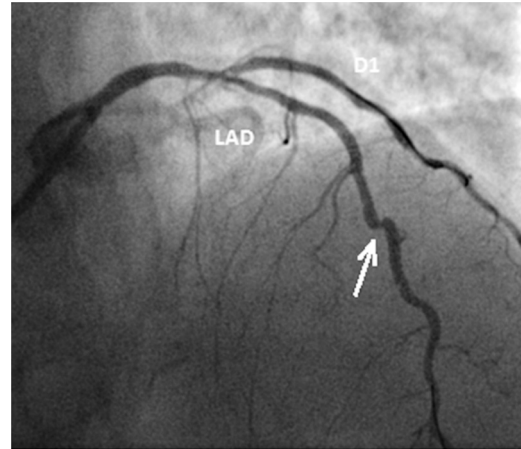
separate ostia of the left circumflex and left anterior descending (LAD) coronary arteries allowing only selective intubation of either of them. There were no angiographically significant lesions in the left circumflex coronary artery. A complex proximal lesion involving bifurcation with the first diagonal branch (Medina 1:1:1) was found in the LAD (Fig. 1). Double wire and mini-crush technique was chosen to approach the bifurcation lesion. Middle LAD spasm distally to the target lesion was observed after wiring the main vessel with a soft guidewire, requiring repeated administration of intracoronary nitroglycerine during the procedure (Figs. 2 and 3). After the final kissing balloons inflation and proximal optimization with noncompliant balloon inflated proximally to bifurcation another bolus of intracoronary nitroglycerine was administered. Subsequent angiogram revealed that the observed mid LAD spasm has changed in appearance completely transecting the artery and resembling a coronary artery dissection with another stenotic lesion appearing proximally (Fig. 4). This finding was followed by retrosternal chest pain and increasing general malaise reported by the patient. The distal flow was unimpaired (TIMI 3) and hemodynamic parameters were stable. Repeated intracoronary nitroglycerine was administered resolving majority of the new mid LAD stenosis and providing more confidence on the spastic component regarding the origin of the second lesion of iatrogenically straightened tortuous segment (Fig. 4). This appearance directed towards removal of guidewire. After the normal anatomy of the tortuous mid LAD segment was restored complete resolution of visual LAD luminal irregularities was observed, and the procedure was finalized (Fig. 5).

### 3. Discussion

Intervention related coronary artery spasm is prevalent and readily recognizable for its association with stent implantation and balloon dilatation, and often transient nature upon

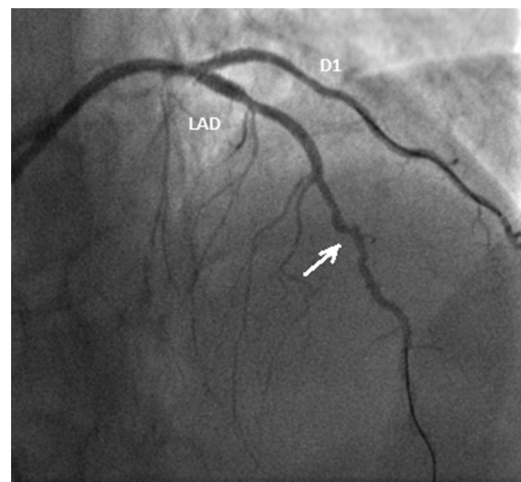


**Fig. 1** – Initial angiogram revealing tortuous left anterior descending (LAD) artery with proximal bifurcation lesion (arrow). D1, first diagonal branch.

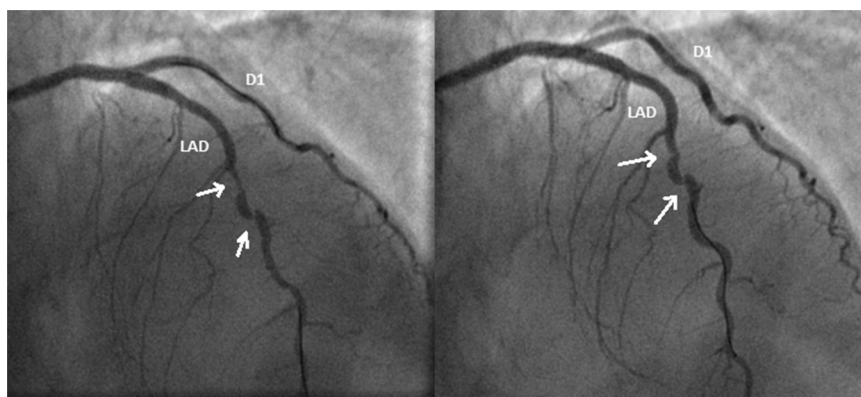


**Fig. 2** – Mid-LAD spasm ('kink') appearing after insertion of a soft guidewire and administration of 200 µg of intracoronary nitroglycerine.

administration of intracoronary nitroglycerine. Segments not associated with direct intervention site may also be affected. The current case report presents the mid-vessel LAD coronary artery spasm, which has been enhanced by straightening of the tortuous LAD segment with a guidewire ("accordion effect") thus mimicking a more complex coronary artery lesion or coronary artery dissection. Dynamic appearance of this iatrogenic pseudo-lesion upon administration of intracoronary nitrates and recognition of angiographic accordion phenomenon prevented from unnecessary stent implantation and allowed removal of guidewire which otherwise would have been prohibited if diagnosis of coronary artery dissection was established. Similar appearances have been previously described in the literature known as the accordion phenomenon, most commonly affecting the right coronary artery, left circumflex coronary artery, occasionally – the left internal mammary artery graft interventions, while similar



**Fig. 3** – Mid-LAD lesion changing appearance after diagonal (D1) branch stenting and balloon inflation in the proximal LAD. Extensive mid-LAD spasm evident despite administration of intracoronary nitroglycerine.



**Fig. 4 – Left: New stenotic mid-LAD lesion (upper arrow) and transection-like appearance of previous mid-LAD spasm/kink mimicking coronary artery dissection after simultaneous kissing balloon inflation in proximal LAD and diagonal branch after stenting and administration of 200  $\mu$ g of intracoronary nitroglycerine. Right: Resolving appearance of proximal new lesion (upper arrow) and unchanged appearance of the distal pseudo-lesion (lower arrow) after repeated bolus of intracoronary nitroglycerine (200  $\mu$ g).**

LAD coronary artery phenomena have been reported the least often [3–6]. Coronary artery spasm is known to be associated with percutaneous coronary intervention tools and techniques (catheters, wires, balloon and stent inflation) and is responsive to administration of intracoronary nitroglycerine. In the meantime coronary artery accordion effect is a result of a mechanical straightening of a tortuous coronary vessel on a coronary guidewire and is unresponsive to intracoronary vasodilators. Other authors have described similar cases of iatrogenically induced accordion effect and suggested the same management strategy – removal of the guide wire [3–7]. In our case coronary artery spasm and accordion effect occurred simultaneously. Intravascular ultrasound examination may be useful in clinically ambiguous cases in order to reliably assess coronary artery lumen and distinguish true intracoronary lesions (atherosclerotic burden, intimal dissec-

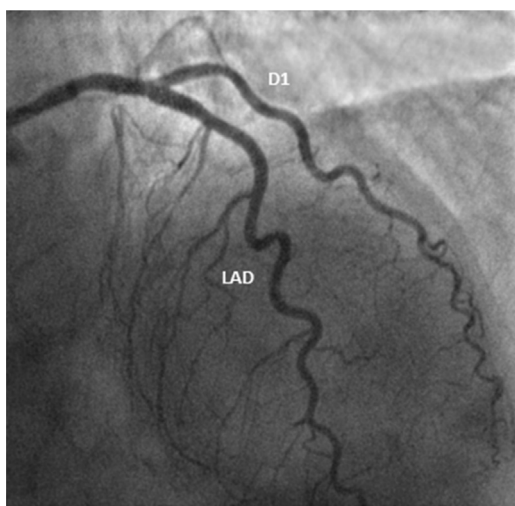
tion flap) from potentially transient conditions (refractory coronary vasospasm, iatrogenic intimal infolding, etc.) [2]. Awareness of these angiographic phenomena allowed correct diagnosis making and selection of the optimal management strategy at the time of the procedure.

#### 4. Concluding remarks

Recognition of iatrogenic angiographic pseudo-lesions and complications of percutaneous coronary interventions allows prompt selection of the treatment strategy at the time of the procedure and prevents from unnecessary further intervention.

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**Fig. 5 – Restoration of LAD anatomy after removal of guidewire was followed by resolution of both previously evident iatrogenic pseudo-lesions.**