folia medica

Folia Medica 66(5):731-736
DOI: 10.3897/folmed.66.e121658

Case Report

Iatrogenic Coronary Artery Dissection Extending into the Ascending Aorta

Dzhem Farandzha[1,2], Iva Gasharova-Petrova[3], Dobri Hazarbasanov[4]

[1] *St Anna University Hospital, Sofia, Bulgaria*
[2] *St Kliment Ohridski Sofia University, Sofia, Bulgaria*
[3] *Lozenetz University Hospital, Sofia, Bulgaria*
[4] *Heart and Brain Center of Clinical Excellence, Burgas, Bulgaria*

Corresponding author: Dzhem Farandzha, Cardiology, St Anna University Hospital, Sofia, 1 Dimitar Mollov, 1750 Sofia, Bulgaria; Email: cemf@abv.bg; Tel.: +359 886156014

Received: 19 May 2024 ♦ **Accepted:** 1 July 2024 ♦ **Published:** 31 October 2024

Citation: Farandzha D, Gasharova-Petrova I, Hazarbasanov D. Iatrogenic coronary artery dissection extending into the ascending aorta. Folia Med (Plovdiv) 2024;66(5):731-736. doi: 10.3897/folmed.66.e121658.

Abstract

One of the most feared complications of percutaneous coronary interventions is coronary artery dissection. Rarely, such dissections can propagate into the ascending aorta, which may then require surgical intervention. We present the case of a 50-year-old patient with new-onset angina and two-vessel coronary artery disease who underwent percutaneous coronary intervention on the right coronary artery, complicated by an iatrogenic coronary dissection extending into the ascending aorta. A decision was taken to perform emergent cardiac surgery due to ongoing chest pain and the extent of the dissection. Computed tomography after surgery revealed no signs of aortic dissection with normal dimensions in all aortic segments. The patient was discharged home in a stable condition.

Keywords

iatrogenic dissection, percutaneous coronary intervention

INTRODUCTION

Coronary artery dissection during percutaneous coronary interventions (PCI) presents a complex and challenging scenario for clinicians, sometimes necessitating surgical intervention for resolution. The latter is especially valid in cases of coronary artery dissection extending to the aorta. While PCI has revolutionized the management of coronary artery disease, the occurrence of iatrogenic aortic dissection remains a rare but potentially life-threatening complication. This phenomenon encompasses a spectrum of clinical presentations ranging from asymptomatic cases to acute coronary syndromes and hemodynamic instability leading to cardiogenic shock and death. The decision-making process regarding the optimal management strategy requires a thorough understanding of the underlying pathophysiology, risk factors, diagnostic modalities, and available treatment options. In this case report, we aim to explore the current understanding, challenges, and advancements in the management of coronary artery dissection extending to the aorta during PCI, focusing on the indications and outcomes of surgical intervention in these complex cases.

CASE REPORT

A 50-year-old woman was admitted to a secondary hospital with a new onset of typical chest pain on exertion. Her overall condition was satisfactory with no pathologic findings on physical exam. Her blood pressure was 120/70 mmHg and her heart rate was 72 bpm. No significant ST-segment deviation on ECG was observed ***(Fig. 1)*** *and conventional troponin was within reference ranges.*

Copyright by authors. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

PENSOFT.

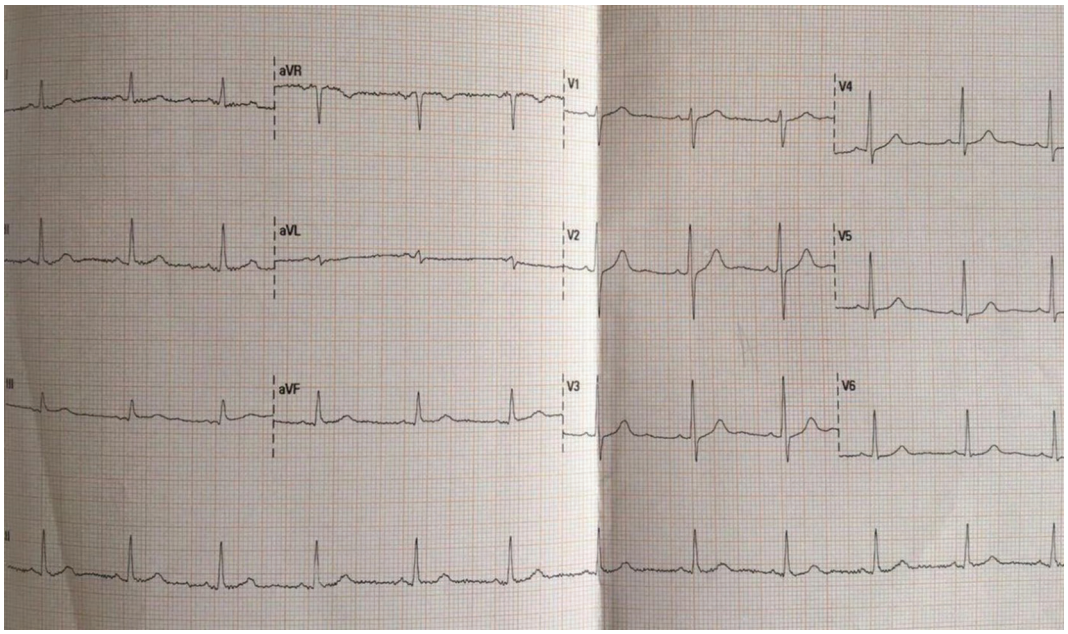

Figure 1. ECG obtained on admission.

Transthoracic echocardiography (TTE) revealed a preserved left ventricular ejection fraction (59%), normal valve function, and no wall motion abnormalities (WMA). Her risk factors for coronary artery disease (CAD) were hypertension and hyperlipidemia. She did not report any family history of CAD or smoking. She had been taking a fixed combination of perindopril/indapamide/amlodipine 5/1.25/5 mg daily and levothyroxine 50 mcg due to underlying hypothyroidism. Although her GRACE score was low at 88, the patient was referred for coronary angiography due to the very typical angina symptoms.[1] Angiography revealed a 70% stenosis of the left circumflex (LCx) artery and a critical lesion in the middle segment of the right coronary artery (RCA) ***(Figs 2, 3)****.*

A decision was taken to perform PCI of the RCA. A Judkins right (JR) 3.5 guiding catheter was used to engage the RCA. Since there was difficulty crossing the lesion with a workhorse guidewire, a 1.5×10 mm balloon was used for better support. At this moment, the patient complained of chest pain and ST-segment elevations were observed on the ECG monitor. A small contrast injection showed dissection in the middle segment of RCA, starting from the proximal part ***(Fig. 4)****. Fortunately, the guidewire now seemed to have*

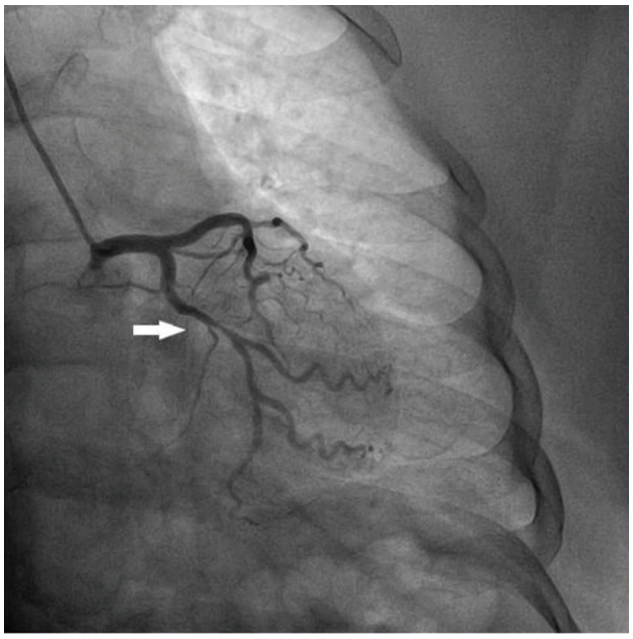

Figure 2. A 30° caudal projection showing LCx with a 70% stenosis (white arrow).

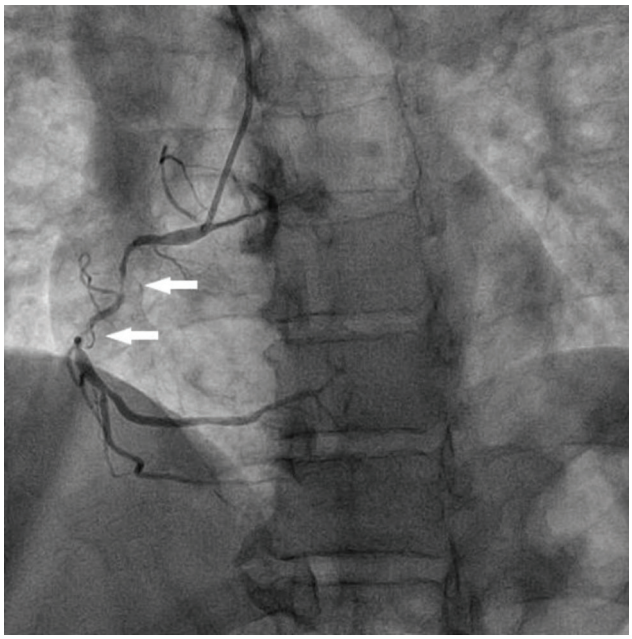

Figure 3. A 30° left anterior oblique (LAO) view of the RCA showing two critical stenoses from the proximal to the middle segment of the RCA (white arrows).

crossed the lesion. However, when a second contrast injection was performed to check the position of the latter, a retrograde dissection was observed which extended to the right coronary cusp and ascending aorta ***(Fig. 5)****.*

Immediate implantation of a drug-eluting stent (DES) 3.0×24 mm and post-dilatation with a non-compliant (NC) balloon 3.5×10 mm at the ostium of the RCA was performed at 24 atm ***(Fig. 6)****. Despite no blood flow (TIMI 0) in the distal RCA and the aortic dissection* ***(Fig. 7)****, the patient remained stable with mild to moderate chest pain, in normal sinus rhythm with a heart rate of 90 bpm and blood pressure of 105/70 mmHg. Several unsuccessful distal recanalization attempts were made.*

After discussing the case with cardiac surgeons, the pa-

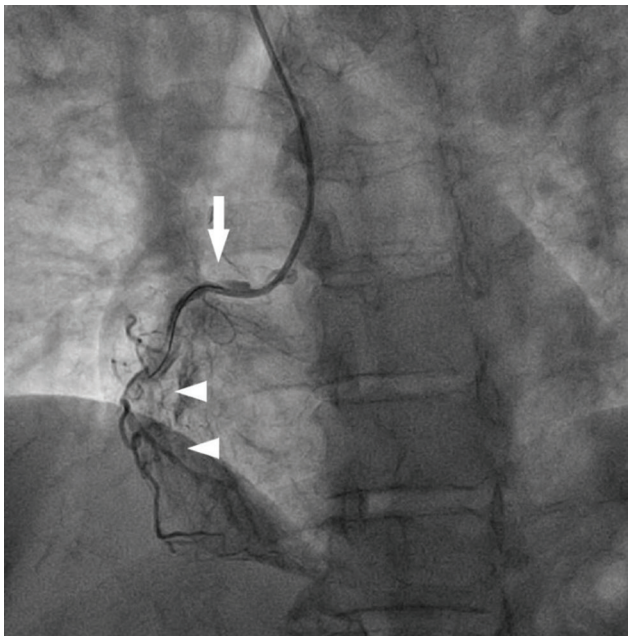

Figure 4. A dissection is seen from the proximal to the middle segment of the RCA (white arrow). There is minimal to no blood flow distal to the dissection (white arrowheads).

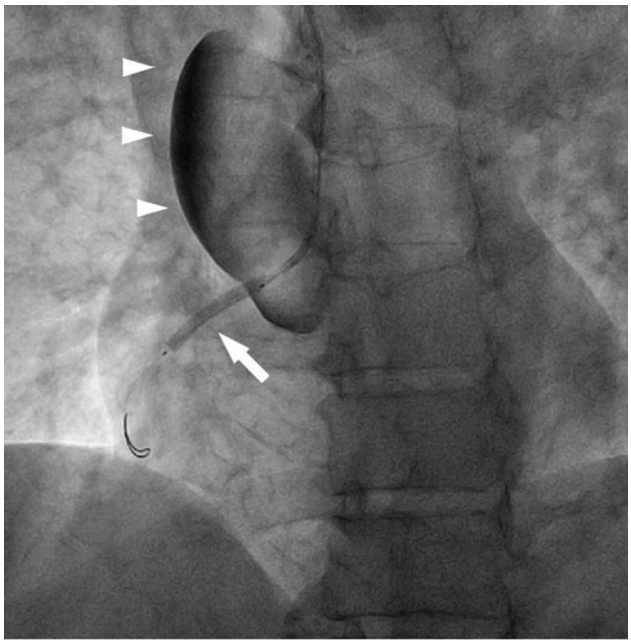

Figure 6. A drug-eluting stent 3.5×24 mm (white arrow) being placed at the ostium of the RCA is seen. The contrast from the previous injection is trapped within the false lumen of the ascending aorta (white arrowheads).

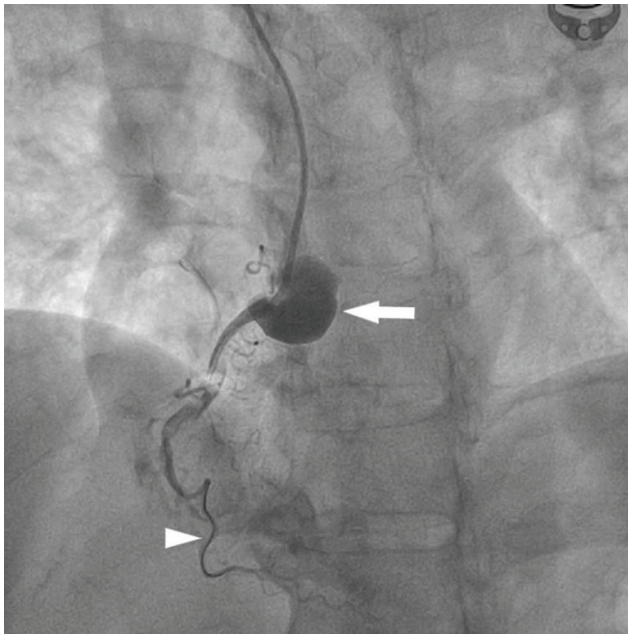

Figure 5. The moment when the dissection extended proximally to the right aortic cusp (white arrow) is caught on fluoroscopy. The guidewire is placed distally in a right ventricular branch (white arrowhead).

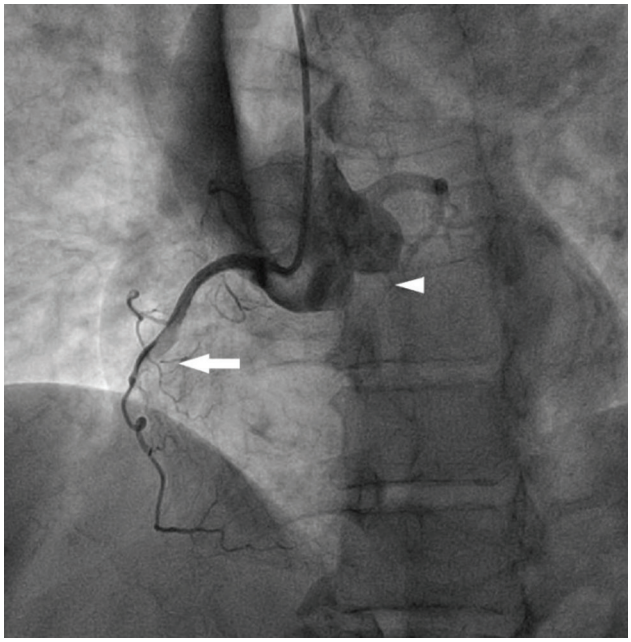

Figure 7. There is no distal in the RCA below the level of the arrow. Interestingly enough, there is also no aortic regurgitation visible (white arrowhead).

Folia Medica

tient was transferred to a tertiary hospital with a cardiovascular surgery on site. She was admitted after midnight, approximately 3 hours after the dissection. ECG on admission showed ST-elevations, most prominent in lead III, and ST-depressions with negative T-waves in lead I and aVL ***(Fig. 8)****. Computed tomography (CT) was performed* ***(Figs 9, 10)****.*

The heart team decided to operate immediately (5 hours after PCI) using two saphenous vein grafts (SVGs) to the RCA and LCx. Since there was no aortic regurgitation on the pre-op TTE, only milking of the aorta was performed without replacement of the aortic valve, nor of the ascending aorta. On post-op transthoracic echocardiography akinesia of the inferior wall and posterior septum was observed with a left ventricular ejection fraction (EF) of 52%. CT after surgery revealed no signs of aortic dissection with normal dimensions in all aortic segments ***(Fig. 11)****.*

The patient was discharged on the 7th postoperative day in a stable condition with Q-waves in the inferior leads ***(Fig. 12)*** *and persisting wall-motion abnormalities in the inferior wall.*

At one-year follow-up, the patient reported having normal physical activity without any symptoms of angina.

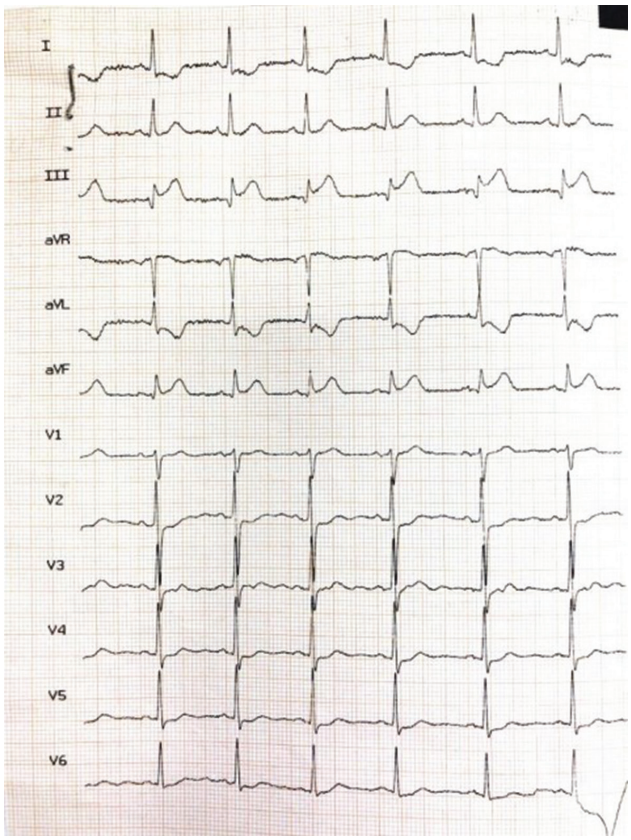

Figure 8. ECG on admission with ST-elevations in lead III, and ST-depressions with negative T-waves in lead I and aVL.

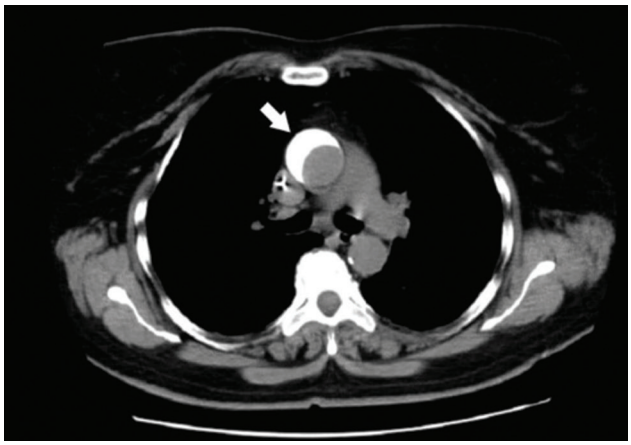

Figure 9. Native CT showing the false lumen (white arrow) with trapped contrast from the coronary angiography.

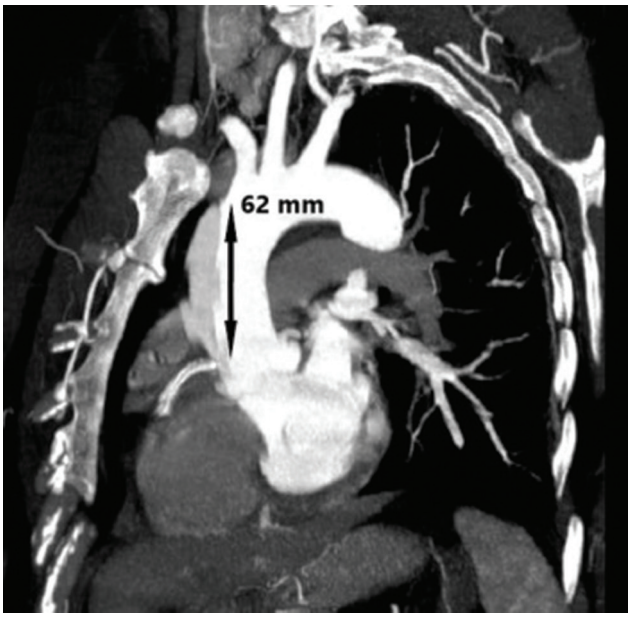

Figure 10. CT with contrast showing the extent of the dissection (black arrow).

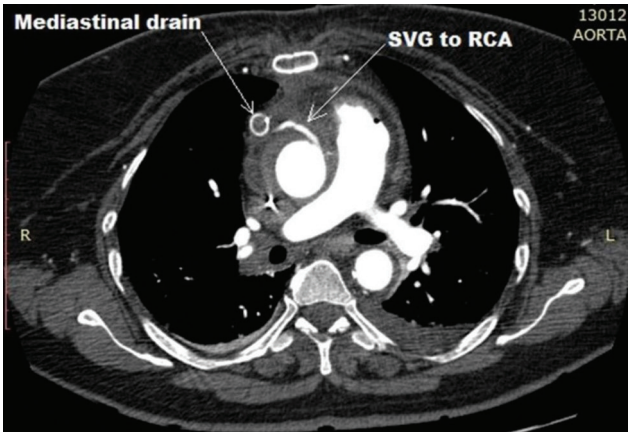

Figure 11. Post-operative CT with contrast showed no signs of aortic dissection. SVG: saphenous vein graft; RCA: right coronary artery.

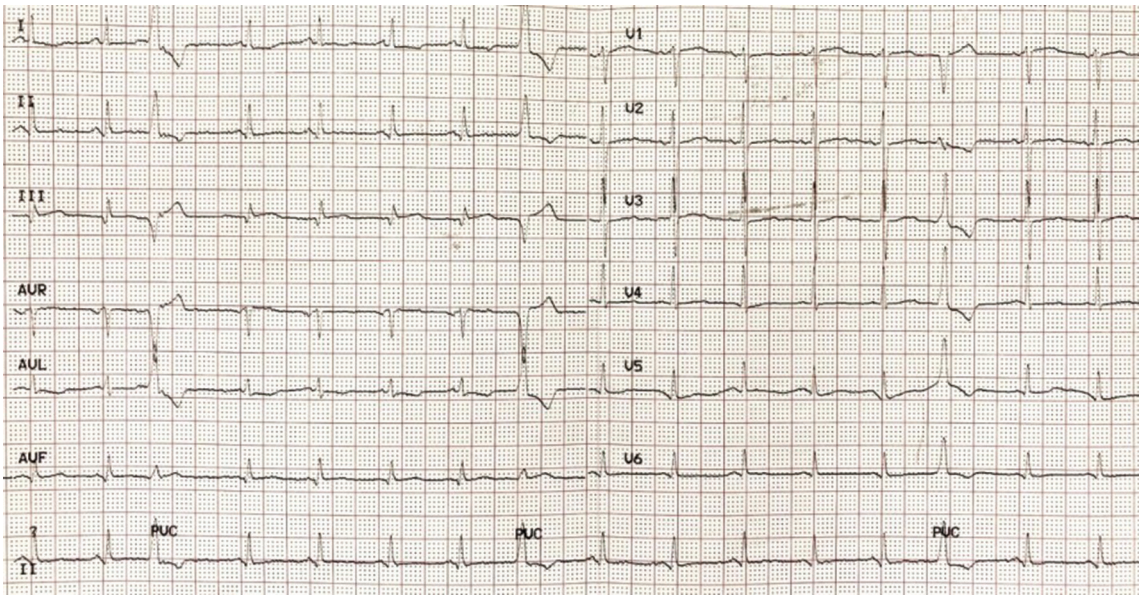

Figure 12. ECG on discharge showing Q-waves in the inferior leads and several premature ventricular contractions (PVCs).

DISCUSSION

Although coronary artery dissections during PCI, especially small non-flow limiting ones, are not that uncommon, most of them are asymptomatic, or their entries are easily sealed off by stenting.[2-4] Rarely, however, coronary dissections may extend to the ascending aorta. In the landmark publication of Dunning et al., the authors categorize such dissections into 3 classes with class I dissection involving the aortic cusp only, class II involving the cusp and extending up the aorta less than 40 mm, and class III dissections involving the aorta more than 40 mm in length.[5] The patient presented in this case report had a class III dissection and similarly to the patients in the previously cited publication required surgical intervention due to the extent of the dissection and ongoing chest pain as a result of distal vessel occlusion. In another more recent publication by Gennari et al., the authors describe a similar strategy; however, unlike our approach, they recommend ascending aorta replacement in class III dissections.[6]

Several learning points can be made based on the presented case report and the literature review of similar published cases. First of all, most iatrogenic aortic dissections occur during angiography or PCI of the right coronary artery (RCA) and even small contrast injections may help an initially small dissection extend up the coronary cusp and involve the ascending aorta. In such cases, immediate stenting of the dissection entry site should be attempted to seal the dissection and prevent its progression without further contrast injections. Surgical intervention should be used only in select cases such as when the dissection involves more than 40 mm of the ascending aorta and there is at least one of the following: hemodynamic compromise, severe acute aortic regurgitation, hemopericardium, inability to seal the dissection entry site, or distal vessel occlusion. Lastly, surgical intervention does not always have to involve replacing the ascending aorta even in class III dissections.

CONCLUSION

In conclusion, prompt recognition, decisive interventional strategies, and careful consideration of surgical options are paramount in managing iatrogenic coronary artery dissections extending to the ascending aorta.

Acknowledgments

We acknowledge our thanks to Drs. Delyan Evrev and Petyu Mishev for providing their professional expertise on the case.

Funding

The authors have no funding and no support to report.

Competing Interests

The authors have declared that no competing interests exist.

REFERENCES

1. Fox KA, Dabbous OH, Goldberg RJ, et al. Prediction of risk of death and myocardial infarction in the six months after presentation with acute coronary syndrome: prospective multinational obser-

vational study (GRACE). BMJ 2006; 333(7578):1091. doi: 10.1136/bmj.38985.646481.55
2. Page E, Kostantinis S, Karacsonyi J, et al. Incidence, treatment and outcomes of coronary artery dissection during percutaneous coronary intervention. J Invasive Cardiol 2023; 35(7):E341–E354.
3. Shah P, Bajaj S, Shamoon F. Aortic dissection caused by percutaneous coronary intervention: 2 new case reports and detailed analysis of 86 previous cases. Tex Heart Inst J 2016; 43(1):52–60. doi: 10.14503/THIJ-14-4585
4. Cappelletti A, Margonato A, Rosano G, et al. Short- and long-term evolution of unstented nonocclusive coronary dissection after coronary angioplasty. J Am Coll Cardiol 1999; 34(5):1484–8.
5. Dunning DW, Kahn JK, Hawkins ET, et al. Iatrogenic coronary artery dissections extending into and involving the aortic root. Catheter Cardiovasc Interv 2000; 51(4):387–93. doi: 10.1002/1522-726x(200012)51:4<387::aid-ccd3>3.0.co;2-b
6. Gennari M, Mastroiacovo G, Polvani G, et al. Management of iatrogenic aortic dissections during percutaneous right coronary artery interventions. Braz J Cardiovasc Surg 2022; 37(4):595–8. doi: 10.21470/1678-9741-2020-0570

Ятрогенная диссекция коронарной артерии, распространяющееся на восходящую аорту

Джем Фаранджа[1,2], Ива Гашарова-Петрова[3], Добри Хазарбасанов[4]

[1] *УМБАЛ „Света Анна“, София, Болгария*
[2] *Софийский университет „Св. Климент Охридски“, София, Болгария*
[3] *Университетская больница „Лозенец“, София, Болгария*
[4] *МБАЛ „Сердце и Мозг“, Бургас, Болгария*

Адрес для корреспонденции: Джем Фаранджа, Кардиология, УМБАЛ „Света Анна“, София, ул. „Димитр Моллов“ 1, 1750 София, Болгария; E-mail: cemf@abv.bg; тел.: +359 886 156 014

Дата получения: 19 мая 2024 г. ♦ **Дата приемки:** 1 июля 2024 г. ♦ **Дата публикации:** 31 октября 2024

Образец цитирования: Farandzha D, Gasharova-Petrova I, Hazarbasanov D. Iatrogenic coronary artery dissection extending into the ascending aorta. Folia Med (Plovdiv) 2024;66(5):731-736. doi: 10.3897/folmed.66.e121658.

Резюме

Одним из самых опасных осложнений чрескожных коронарных вмешательств является диссекция коронарной артерии. В редких случаях такие диссекции могут распространяться на восходящую аорту, что может потребовать хирургического вмешательства. Мы представляем случай 50-летнего пациента с впервые выявленной стенокардией и двухсосудистым поражением коронарных артерий, которому было проведено чрескожное коронарное вмешательство на правой коронарной артерии, осложнённое ятрогенной диссекцией коронарной артерии, распространившейся на восходящую аорту. Было принято решение о проведении экстренной операции на сердце из-за продолжающейся боли в груди и степени дссекции. Компьютерная томография после операции не выявила признаков диссекции аорты с нормальными размерами во всех сегментах аорты. Пациент был выписан домой в стабильном состоянии.

Ключевые слова

ятрогенная диссекция, чрескожное коронарное вмешательство