



Iatrogenic Aortocoronary Dissection: A Life Threatening Complication During Percutaneous Coronary Intervention Requiring Urgent Diagnosis and Treatment

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ABSTRACT

An elderly female patient presented with non-ST elevation myocardial infarction, and stent implantation was performed into the right coronary artery (RCA). An aortic dissection, starting from the RCA ostium and extending to both right sinus valsalva and the ascending aorta (AA) occurred due to deep guiding catheter intubation during post-dilatation with non-compliant balloon. Immediately, another coronary stent was implanted in the RCA ostium and plunged into the AA by 2 mm, with a purpose of covering the entry point of the dissection. The patient underwent emergency surgery consisting of AA replacement and RCA by-pass grafting due to insufficient response for stenting. However, the patient died due to pump dysfunction 10 hours after surgery.

Key Words: Aortocoronary dissection; percutaneous coronary intervention; ostial stenting

İatrojenik Aortokoroner Diseksiyon: Perkütan Koroner Girişim Esnasında Karşılaşılan ve Acil Tanı ve Tedavi Gerektiren Ölümcül Bir Komplikasyon

ÖZET

Non-ST elevasyonlu miyokard enfarktüsü ile başvuran ileri yaş kadın hastanın sağ koroner arterine (RCA) stent implantasyonu yapıldı. Sonrasında non-kompliyan balon ile postdilatasyon yapılması esnasında derin kılavuz kateter entübasyonuna bağlı olarak RCA ostiumundan başlayan ve sağ sinus valsalva ile çıkan aortaya (AA) uzanan bir diseksiyon gelişti. Hızlıca RCA ostiumuna diseksiyonun giriş noktasını kapatmak amacıyla aortaya 2 mm taşacak şekilde başka bir stent implantasyonu yapıldı. Bu girişime yeterli yanıt alınmaması sebebiyle hastaya cerrahi olarak AA replasmanı ve RCA'ya by-pass grefti operasyonu yapıldı. Fakat hasta operasyondan 10 saat sonra pompa yetersizliği sebebiyle kaybedildi.

Anahtar Kelimeler: Aortokoroner diseksiyon; perkütan koroner girişim; ostial stentleme

INTRODUCTION

In this case report, we have presented the evaluation and management of an iatrogenic aortocoronary dissection during high risk percutaneous coronary intervention.

CASE REPORT

A 76-year-old hypertensive female patient without known previous coronary artery disease referred to the emergency department with acute onset retrosternal chest pain for 5 hours. The patient was admitted to the coronary intensive care unit as non-ST elevation myocardial infarction, and after performing initial physical examination, laboratory tests and transthoracic echocardiography (TTE), all found to have revealed nothing significant except elevated high-sensitive troponin level. Coronary angiography via right transradial approach showed consecutive, long-segment, highly calcified 70-80-90% occlusion in the right coronary artery (RCA) (Figure 1A), mid 70% in circumflex and proximal 70% (Figure 1B), mid 80% occlusions in the left anterior descending artery (Figure 1C). Heart team decision was percutaneous intervention regarding the patient's age, favorable lesions for stenting and persistent chest pain under medical therapy. Surgical risk was considered a little bit high due to patient's presentation with acute coronary syndrome and high troponin level. Additionally, there was no severe valvular pathology on TTE required surgical interven-

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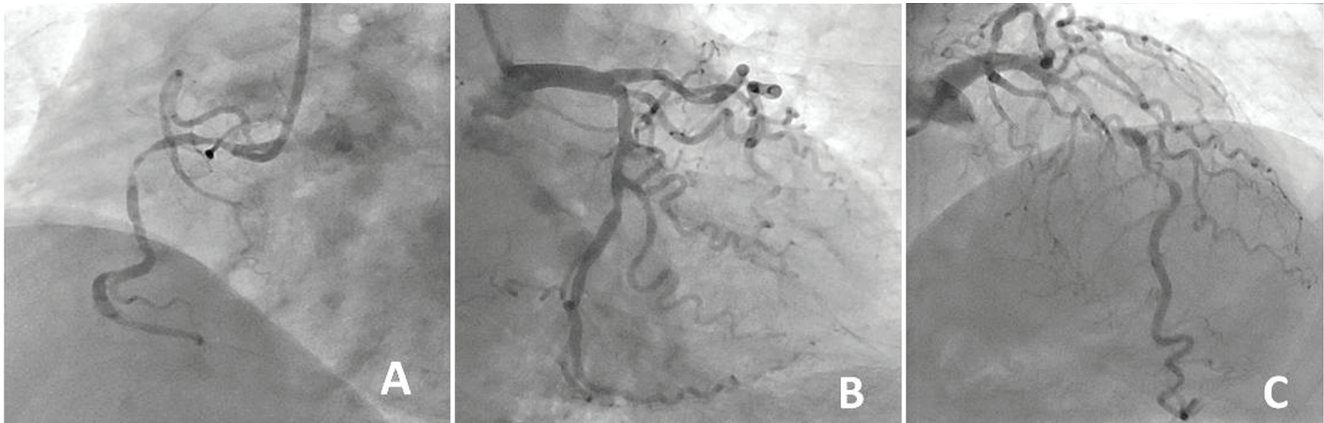


Figure 1. Initial coronary angiography of the right (A), circumflex (B) and left anterior descending (C) coronary arteries.

tion. We decided to start revascularization with RCA, which was supposed to be culprit vessel. RCA ostium was engaged with 6 French right Judkins guiding catheter, and the lesion was crossed with 0.014-inch regular guidewire. 2.75 x 38 mm (14 atm), 3.0 x 33 mm (20 atm) and 3.0 x 15 mm (24 atm) drug eluting stents were implanted starting from distal to proximal as overlapping, respectively after predilating with a 2.5 x 20 mm semi-compliant balloon (Figure 2). Some difficulty was encountered while advancing the non-compliant balloon after stent implantation. Then deep catheter intubation was performed for stronger support via balloon anchoring technique, and stents were post-dilated with 3.5 x 8 non-compliant (NC) balloon at high pressure. An aortic dissection, starting from the RCA ostium and extending to both right sinus valsalva (Figure 3A) and the ascending aorta (AA) (Figure 3B) was seen

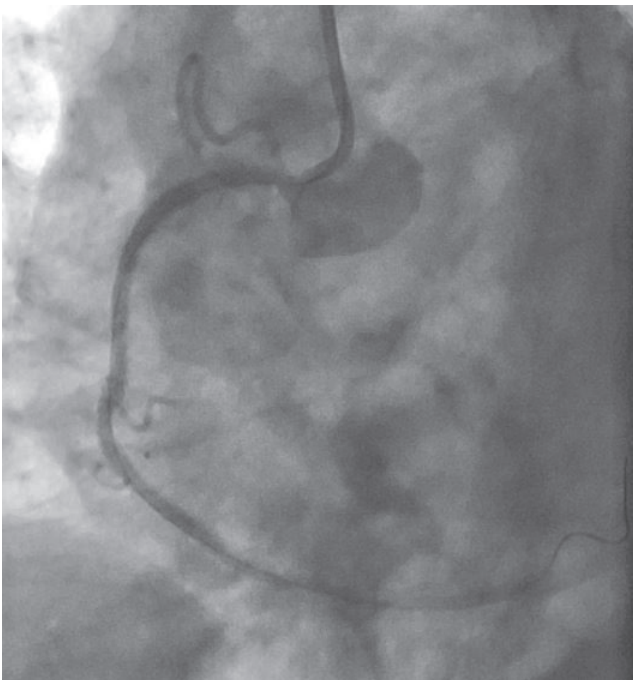


Figure 2. Right coronary artery (RCA) after stent implantation.

in next angiography. Intravenous morphine and intracoronary nitroglycerine were given having observed severe chest pain and acute hypertension. A 3.0 x 13 (24 atm) bare metal stent was immediately embedded in the proximal area and plunged into the AA by 2 mm, with the intention of covering the tear of the dissection. Dissection in the RCA ostium disappeared, and TIMI-3 flow was achieved distally, but subintimal contrast flow was still remaining in the next image (Figure 4). Then the intervention was terminated at this stage and urgent computed tomography angiography (CTA) was performed, showing a 2.5 cm-long dissection starting from the right sinus valsalva and extending through the AA (Figure 5). Preserved left ventricle systolic function without pericardial effusion was seen on bedside TTE. The patient was again discussed with the heart team and underwent surgery regarding persistent severe chest pain, hemodynamic instability and the progression risk of the dissection through the arcus aorta. The aortic dissection was surgically repaired with 33 mm synthetic graft and by-pass was implemented to RCA with saphenous venous graft. The patient died due to pump dysfunction 10 hours after surgery despite all of these efforts.

DISCUSSION

Iatrogenic aortocoronary dissections (IACD) occur in various percutaneous coronary interventions with an incidence of 0.062% and have high mortality risk⁽¹⁾. IACDs are more often seen in the elderly, hypertensive patients, calcified vessels and complex interventions such as acute coronary syndromes and chronic total occlusions. IACDs are urgent situations and need to be managed rapidly without sufficient comprehensive pre-operative assessment that contributes to the high mortality risk. Gold standard test for diagnosis is CTA while acute onset severe chest pain or contrast retain in AA, as in the present case, should be taken into consideration regarding IACD. Additionally, severe increase in coagulation-related indicators, such as platelet counts, D-dimer and fibrinogen/fibrin degradation products are

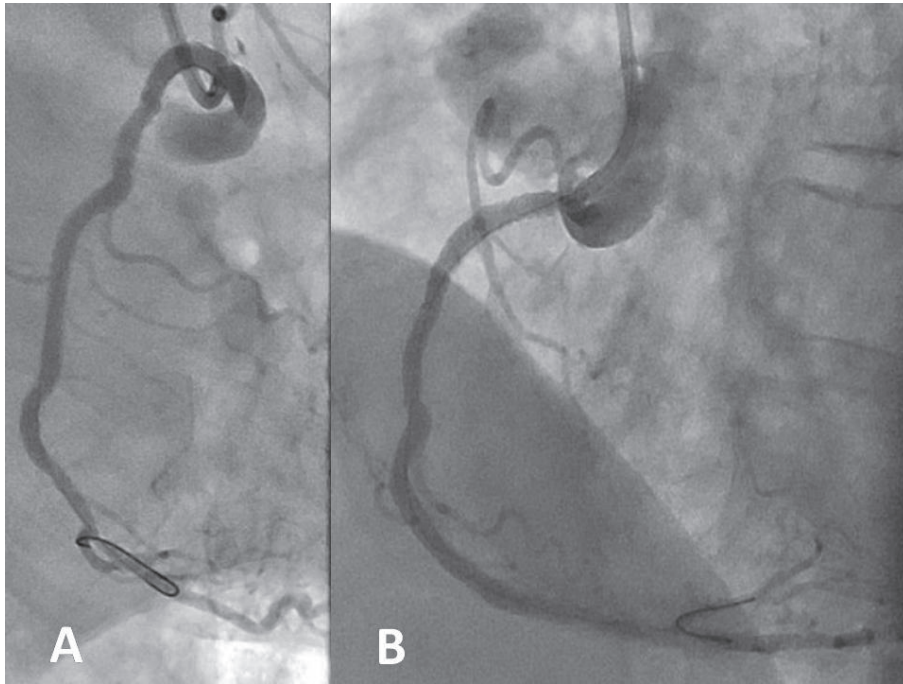


Figure 3. Appearance of the aortic dissection, starting from the RCA ostium and extending to both right sinus valsalva (A) and the ascending aorta (AA) (B).

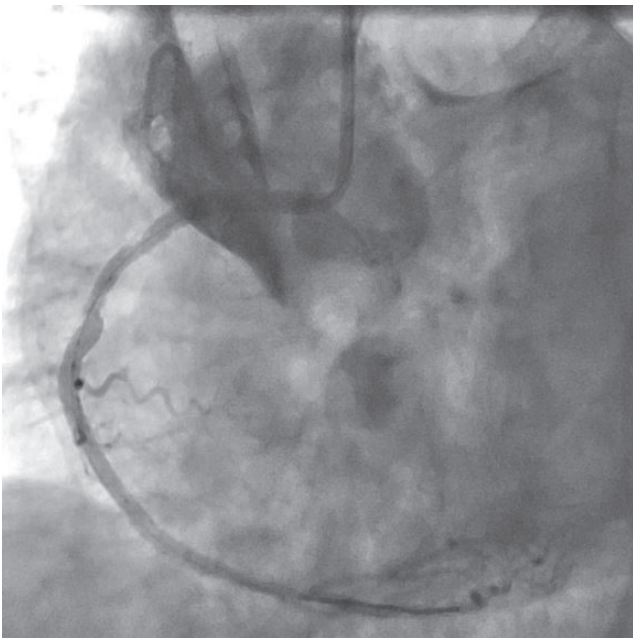


Figure 4. Subintimal contrast in AA still remains after ostial stent implantation.



Figure 5. CT angiography view of the dissection in AA.

indicative of IACD⁽²⁾. Although there is no consensus on treatment yet, when IACD is observed, initially contrast injection should be limited, chest pain should be eliminated with narcotic analgesics, blood pressure should immediately be reduced and an ostial stent could be implanted for sealing the origin of the dissection that plays a critical role for further prognosis. Treat-

ment approach for IACD is still controversial and limited with only small case series. Dunning et al. have proposed a classification and divided the IACDs in their case series for three groups as follow; Class-1: Focal dissection restricted to the ipsilateral cusp, Class-2: Involving the cusp and extending up the AA < 40 mm, Class-3: Involving the cusp and extending up the AA > 40 mm. Class-1 and class-2 dissections should be treated

by conservative approach following ostial stent implantation; however, surgical intervention is usually needed for Class-3 dissections⁽³⁾. In our present case, IACD occurred due to deep catheter intubation during stent postdilatation stage. In the current case, due to severe calcification and tortuosity, advancing the NC balloon became difficult after sub-optimally apposed, long-segment and overlapping stents. In addition to the challenging vascular nature, inadequate crossing profile of the NC balloon that was used forced the operator to use more aggressive techniques such as deep guiding catheter intubation with balloon anchor. This technique enables strong catheter support and facilitates stent or balloon crossing in difficult cases, but it is a dangerous technique and may cause severe complications during PCI so it should not be applied in the first step. Presence of high calcification in coronary arteries and AA because of chronic uncontrolled hypertension contributed to the dissection. Heavy chest pain was relieved and systolic blood pressure was reduced immediately when the dissection was noticed as mentioned above. After the first medical treatment, an urgent stent was implanted in the proximal area and plunged into the AA by 2 mm to cover the tear of the dissection which has been suggested in all published case series before. Covered graft stents may be more useful instead of regular coronary stents in order to seal the entry point of dissection⁽⁴⁾. The current patient could be determined as class-2 according to the Dunning classification and followed in the coronary intensive care unit conservatively after ostial stenting parallel to their suggestion. Unfortunately, surgical intervention became inevitable due to inadequate clinical and hemodynamic improvement in close follow-up and progression risk of the dissection through the arcus aorta. Repairment of the dissection in AA with a synthetic graft and by-passing the RCA because of incomplete expansion of the stents was the proffered surgical procedure regarding the patient's age, hemodynamic instability, urgency of the procedure and restricting the operation duration. Other vessels were planned to be revascularized percutaneously in elective condition later. Furthermore, there is not enough experience on endovascular treatment for IACDs, it may be useful for patients with high surgical risk⁽⁵⁾.

CONCLUSION

IACD is a rare but fatal complication during various coronary interventions and needs urgent diagnosis. Although there is no consensus for treatment, initially implanting an ostial stent in order to cover the entry point of the dissection immediately is feasible. This could ensure restoring coronary blood flow rapidly and limiting the progression of the dissection. Regarding the high perioperative mortality risk, surgical treatment should only be considered when insufficient clinical response for conservative treatment after stent implantation or extension of the dissection over 40 mm in AA with/without presence of massive pericardial effusion or aortic valve impairment is seen. We need more clinical and evidence-based experience to determine the optimal treatment strategy. In the future, endovascular treatment experience may be improved in terms of repairment of IACDs.

Informed Consent: Informed consent form was obtained from patient.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept/Design - ST; Analysis/Interpretation - OB; Data Collection - OB; Writing - AH; Critical Revision - AK; Final Approval - BK; Overall Responsibility - AH.

Conflict of Interest: The authors have no conflict of interest to declare.

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