

# Post-myocardial infarction left ventricular intramyocardial dissecting hematoma

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## SOUHRN

**Úvod:** Intramyokardiální disekující hematom (IDH) je dutina ve stěně srdce vyplněná krví, která vzniká oslabením stěny nekrozou po infarktu myokardu. IDH se může vytvořit ve stěně levé komory, pravé komory nebo interventrikulárního septa.

**Popis případu:** Kazuistika popisuje pacienta s IDH jako vzácnou komplikaci po infarktu myokardu. Pacient byl hospitalizován pro trvající obtěžující kašel tři měsíce po prodělání infarktu myokardu řešeném implantací stentu. Dle echokardiografie bylo podezření na kryptou rupturu volné laterální stěny s obrazem pseudoaneurysmatu, pro kterou bylo rozhodnuto o operačním řešení. Při operaci byl nalezen plošný dutiny ve stěně levé komory komunikující otvorem s levou komorou. Vnitřní i vnější stěna dutiny obsahovala srdeční svalovinu, a tak byla dutina diagnostikována jako IDH. Otvor i dutina byly uzavřeny stehy přes meshové podložky a suturou přes meshový proužek. Pooperační průběh se obešel bez komplikací a pacient byl propuštěn osmý den po operaci.

**Diskuse:** Diagnostika IDH se zakládá na anamnéze infarktu myokardu a na nálezech na echokardiografii. Mezi známky echokardiografického obrazu IDH patří vytvoření nové dutiny uvnitř srdeční stěny s echo-lucentním středem. Diferenciální diagnostika IDH zahrnuje aneurysma, pseudoaneurysma, trombus uvnitř dutiny LK nebo trabekuly komor.

**Závěr:** IDH je komplikace infarktu myokardu, na kterou je třeba pomyslet při diferenciální diagnostice nově vzniklé dutiny ve stěně levé komory na ultrazvukovém vyšetření. Konzervativní řešení je možné u IDH malých rozměrů, u kterých nedochází k progresi. U hemodynamické nestability pacienta nebo u velkých nebo progredujících IDH je namístě chirurgické řešení.

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## ABSTRACT

**Background:** Intramyocardial dissecting hematoma (IDH) is blood-filled cavitation in the cardiac wall that can occur as a complication of myocardial infarction, chest trauma, or percutaneous intervention. It can develop in the left ventricular free wall, the right ventricle, or the interventricular septum.

**Case report:** The case report describes a patient with IDH as a rare complication of myocardial infarction. The patient was hospitalized for ongoing irritating cough three months after ST elevated myocardial infarction treated with percutaneous coronary intervention. The echocardiography showed the image of a pseudoaneurysm of the left ventricle. The patient underwent surgery where a cavitation inside the left ventricle myocardial wall communicating with the left ventricle was found. The inner and outer border of the cavitation included myocardium, therefore diagnosis of IDH was established. The communication and the cavitation were closed with pledgeted sutures and a direct suture with a mesh stripe. Postoperative hospitalization was without complications and the patient was dismissed the eighth day after the surgery.

**Discussion:** Diagnosis of IDH consists of anamnestic information of myocardial infarction and assessment on echocardiography. On echocardiography the IDH shows as a neocavitation within the heart wall with an echo-lucent center. The differential diagnosis of IDH includes aneurysm, pseudoaneurysm of the heart, thrombus of the ventricle and trabeculae.

**Conclusion:** The IDH is a post-infarction complication important to include in the differential diagnosis of newly formed cavitation inside the ventricle wall seen on echocardiography. Conservative management is suggested when the IDH is small and not growing. Surgery is indicated if the patient is unstable or the IDH is large or growing.

### Keywords:

Complication of myocardial infarction

Echocardiography

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## Background

Intramycardial dissecting hematoma (IDH) is a rare complication of acute myocardial infarction, chest trauma, or percutaneous intervention. It is a subtype of subacute myocardial rupture. IDH is blood-filled cavitation in the cardiac wall created by hemorrhagic infiltration into and through the myocardium of the ventricle or interventricular septum. The cavitation's borders are made of epicardium and myocardium externally, endocardium and myocardium internally. It can develop in the left ventricular free wall, the right ventricle, or the interventricular septum.<sup>1,2</sup>

Formation of IDH may result from rupture of myocardial vessels in the weakened necrotic wall post-myocardial infarction, or from an acute increase of coronary capillary perfusion pressure.<sup>3</sup> IDH can occur as a complication of myocardial infarction or after thoracic trauma.<sup>4</sup> Mandke et al. described IDH as a rare complication after using a stabilizer in off-pump revascularization.<sup>5</sup>

The case report describes post-infarction IDH masquerading as a pseudoaneurysm.

## Case report

A 75-year-old male patient with hypertension and diabetes had ST elevated myocardial infarction (STEMI) of the lateral wall. Cardiac catheterization after the STEMI showed total occlusion of an obtuse marginal artery (from left circumflex) treated with percutaneous coronary intervention (PCI) with a drug-eluting stent. After the STEMI the patient had Dressler pericarditis.

The patient was hospitalized in internal ward three months after the episode for an irritating cough. Echocardiography was performed and showed a pseudoaneurysm of the left ventricle. The pseudoaneurysm was localized between the basal and middle parts of the lateral wall. The patient was treated with antitussives, benzodiazepine, and nitrates for hypertension.

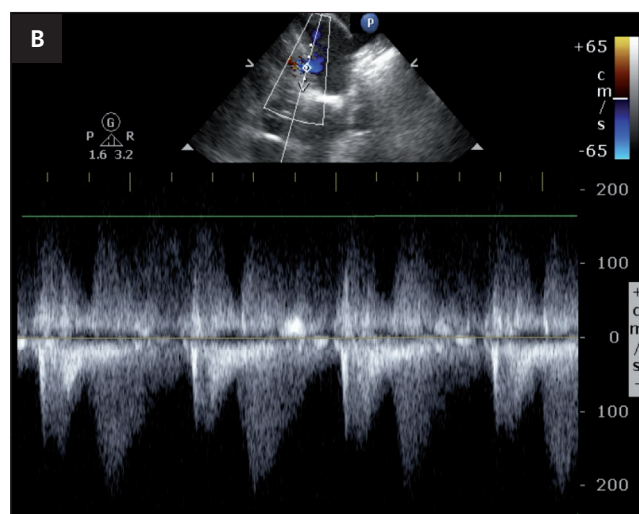
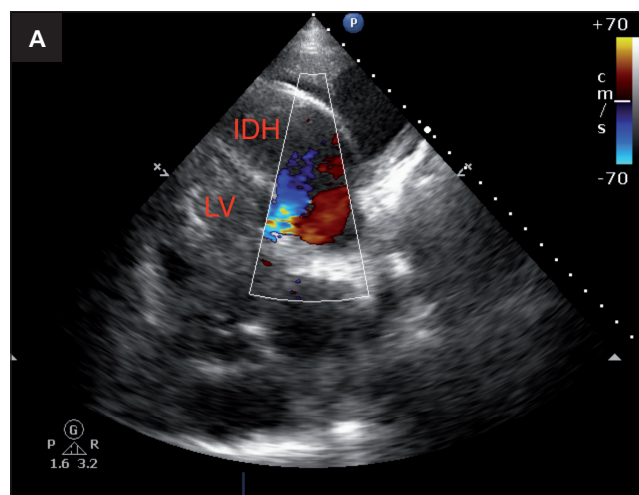


Fig. 2 (A) and (B) – To-and-fro flow inside the cavitation of the LV wall (IDH) confirmed by Doppler ultrasonography. IDH – intramycardial dissecting hematoma; LV – left ventricle.

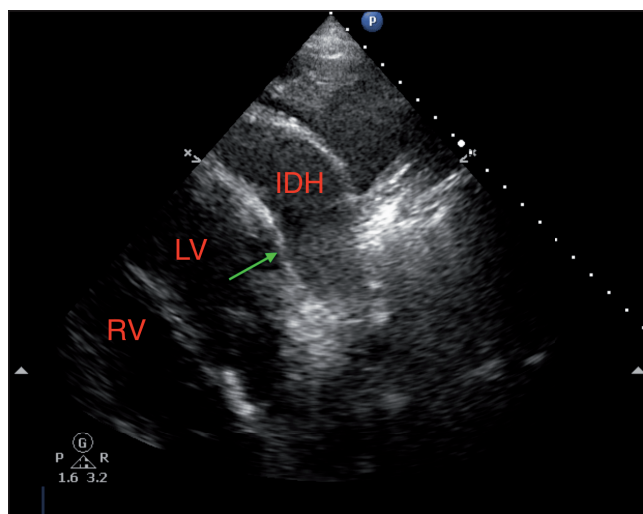


Fig. 1 – Echolucent cavitation in the LV wall (IDH) communicating with LV through a small hole (green arrow). IDH – intramycardial dissecting hematoma; LV – left ventricle; RV – right ventricle.

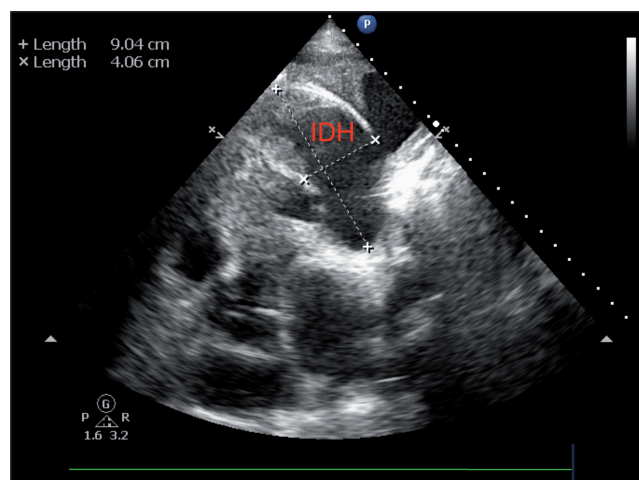


Fig. 3 – Size of the cavitation of the left ventricle. IDH – intramycardial dissecting hematoma.



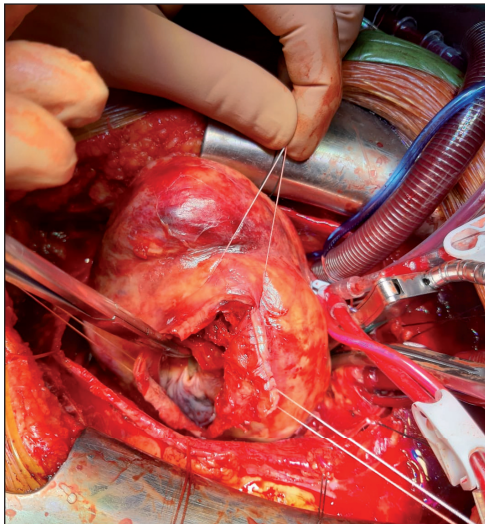


Fig. 4 – Cavitation 8 × 4 × 1 cm in the wall of the LV.

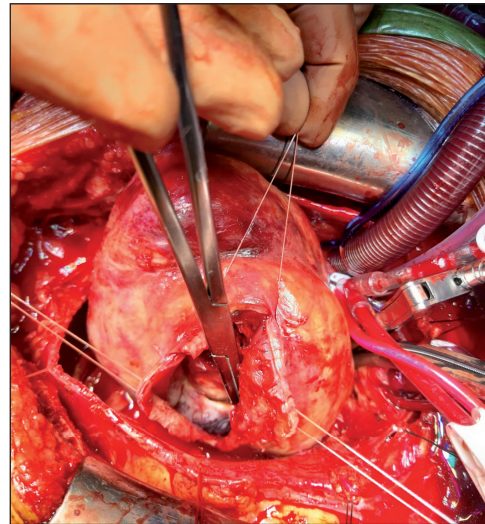


Fig. 5 – Cavitation communicating with the LV (forceps are going through the hole into the LV).

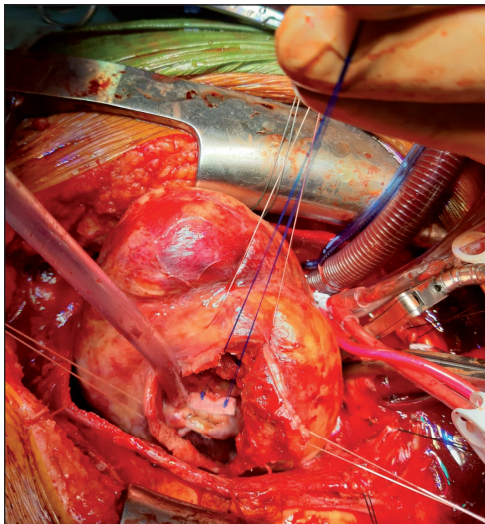


Fig. 6 – Closure of the hole communicating direct suture with meshed strips.

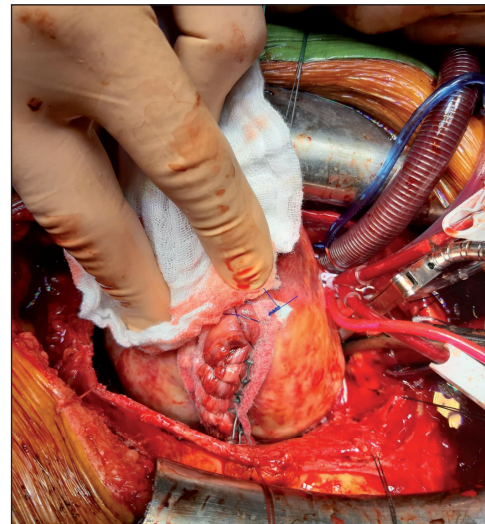


Fig. 7 – Closure of the cavitation with LV with pledged suture.

The patient was transferred to the Centre of Cardiovascular Surgery and Transplantation (CKTCH) for surgery. At admission he did not have any chest pain or shortness of breath. The only thing that bothered him was the coughing ongoing since the myocardial infarction.

Transthoracic echocardiography showed echolucent cavitation beside the posterior/lateral wall of the left ventricle (LV). The size of the cavitation was 4 × 9 cm and it communicated with LV through a small 1-cm hole in the lateral wall of the LV. Inside the cavitation there was a thrombus on the side nearer to the heart apex. The rest of the cavitation was free with blood flow going in-and-out of the cavitation confirmed by Doppler ultrasound (Fig. 1–3). The cavitation was diagnosed as pseudoaneurysm and cardiac surgery was indicated for the risk of complete rupture as a complication of post-myocardial infarction pseudoaneurysm.

The systolic function of LV was good with an ejection fraction of 65%, the heart did not have any other patho-

logies. There were bilateral pleural effusions – on the right side 400 ml, on the left 1000 ml.

At CKTCH new coronary angiography was performed with the finding: the left main coronary artery without stenosis, diffuse up to 50% stenosis of the proximal and middle part of the left anterior descending artery (LAD), the stent in the obtuse marginal artery (OM) had 90% restenosis and closure of peripheral part of OM. The right coronary artery was without stenosis.

The patient underwent an operation. Epicardium was heavily fibrotic and thick because of Dressler syndrome pericarditis. The patient was put on cardiopulmonary bypass (CPB) and the heart was arrested by cardioplegia.

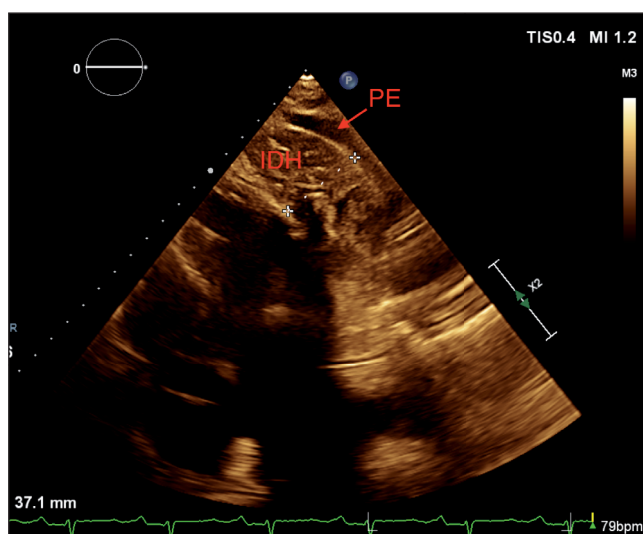
There was a bulging of thinned wall on the lateral side of the LV. The wall was cut and opened at this site into flat cavitation. The cavitation was 8 × 4 × 1 cm in size (Fig. 4) and communicated with the LV through a 1.5 × 1 cm-big hole (Fig. 5). The inner and outer border of the

cavitation included myocardium, suggesting the diagnosis of IDH.

The hole communicating with the LV was closed with two pledged sutures (Fig. 6) and the cavitation was closed with a direct suture forced with a mesh stripe (Fig. 7). A sample of the outer layer of the cavitation wall was sent for histological examination. The patient's weaning from the CPB was without any complications. The CPB time was 87 minutes, and the heart arrest was 59 minutes long.

Postoperative hospitalization was without complications. On the seventh day after the surgery echocardiography was performed. There was hypertrophic LV with good systolic function and akinetic posterolateral wall of the LV. There was a pericardial effusion of 16 mm beside the lateral wall of the LV. The original cavitation of the IDH was filled with thrombus without any flow detection (Fig. 8). Histological examination confirmed the presence of dense fibrosis and atrophic cardiomyocytes.

The patient was dismissed on the eighth day after the surgery stable and in good condition.



**Fig. 8** – IDH filled with thrombus lateral to the LV. Pericardial effusion on beside the IDH (PE – red arrow). IDH – intramyocardial dissecting hematoma; PE – pericardial effusion.

## Discussion

Diagnosis of IDH can be challenging and is usually done perioperatively or at autopsy.<sup>6</sup> The correct diagnosis consists of anamnestic information of recent myocardial infarction and assessment on transthoracic and/or transesophageal echocardiography, or in some cases on magnetic resonance.<sup>7</sup> Differential diagnosis of IDH includes aneurysm, pseudoaneurysm (PSA) of the heart, both being more frequent complications of myocardial infarction, also thrombus of the LV and trabeculae.<sup>2</sup>

The signs of IDH on echocardiography to distinguish IDH from other possible diagnoses are:<sup>1</sup>

1. The formation of neocavitation within the heart wall with an echolucent center.

2. Mobile thin layer surrounding the cavity made of intact endomyocardium.
3. The presence of myocardium on both the internal and external side of the cavity.
4. Changes in the echogenicity of the neocavitation suggesting blood content.
5. Continuity between the dissecting hematoma and the heart chamber.
6. Blood flow within the dissected hematoma confirmed by Doppler sonography.<sup>1</sup>

The IDH is a dynamic entity and the sonography image changes with time. In the phase of formation of IDH and the phase of spontaneous reabsorption the sonography image is unrecognizable from the image of a thrombus inside the heart chamber. On the other hand, in the dissecting phase of IDH there is echolucent acoustic density similar to blood in the neocavitation.<sup>1</sup> Therefore, in stable patients, a series of ultrasonography examinations are necessary for the correct diagnosis of IDH.

Often the IDH cannot be distinguished from pseudoaneurysm until surgery or autopsy. The outer layer of the IDH consists of pericardium and myocardium in contrast to pseudoaneurysm, whose outer layer consists of the epicardium.<sup>2</sup>

In our patient the diagnosis of PSA was established based on large cavitation on echocardiography. Due to the high risk of PSA rupture the patient was indicated to prompt operation without any other supplemental examination like MRI or CT. The histological examination of perioperative outer layer biopsy showed the presence of cardiomyocytes and therefore confirmed the diagnosis of IDH.

The management of the IDH depends on various factors such as age, hemodynamic stability, the size of the IDH, LV function, and the presence of pericardial effusion. The conservative management is preferred when the patient is stable, the size of IDH is small and consistent and the echogenicity inside the IDH changes from blood to thrombus.

Surgery is suggested if the patient is hemodynamically unstable or there is the presence of pericardial effusion or the IDH is large or growing larger.<sup>7</sup> One of the most severe complications of IDH is progression into complete myocardial rupture. Therefore, when the IDH is managed conservatively, observing the patient and performing a series of ultrasonographic examinations are necessary until spontaneous reabsorption of the IDH or formation of thrombus inside the IDH.<sup>8</sup>

Close monitoring or potential surgery is also suggested in patients older than 60 years, patients with low ejection fraction (EF <30%), patients with anterior MI, as these factors were the most serious independent mortality risk factors.<sup>9</sup>

## Conclusion

The intramyocardial dissecting hematoma is a rare complication of myocardial infarction. It is important to include it in the differential diagnosis of post-myocardial infarction newly formed cavitation inside the left ventricle wall seen on ultrasonography. Conservative management

and further patient observation are suggested when the IDH is small and not growing. Surgery is indicated if the patient is unstable or the IDH is large or growing.

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