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INTRACORONARY THROMBOLYSIS IN YOUNG MYOCARDIAL INFARCTION – A CASE SERIES

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ABSTRACT:

Background: Majority of the STEMI (ST elevation myocardial infarction) cases especially young patients(<50years) have significant amount of thrombus in the culprit arteries. The presence of large thrombus causes decrease in myocardial perfusion at microcirculatory level by embolization either spontaneously or during an attempt of PCI causing adverse effects. Intracoronary delivery of thrombolytic agent in STEMI patients with large thrombus burden is an effective alternative to achieve recanalization of coronaries without stenting.

Case series summary: In the present case series seven patients with age ≤ 50 years who presented with acute STEMI and angiogram showing large thrombus were included. One third of systemic dose of Tenecteplase(TNT) was given intracoronary and check angiogram was done after 24 hours to see the patency of the vessel. We achieved successful recanalization in all the patients without need for stenting with no bleeding complications.

Conclusion: Low dose intracoronary thrombolysis is reasonable option in establishing coronary blood flow in thrombotic occluded coronaries in young STEMI patients. Careful selection of patients and quantification of thrombus is important to achieve optimal results with no bleeding complications.

Keywords: STEMI, intracoronary thrombolysis, coronary thrombus

Introduction:

The optimal treatment for a patient presenting with acute STEMI (ST elevation myocardial infarction) is primary percutaneous coronary intervention (PCI). But the majority of the STEMI cases have significant amount of thrombus in the culprit arteries. The prevalence of large intracoronary thrombus varies among different studies. Sianos *et al.* reported that 70% of STEMI patients undergoing primary PCI have large thrombus in culprit artery(1). A study by Miranda- Guardiola F on behalf of Spanish AMIcath Registry stated that one third of patients with STEMI have shown large thrombus (2). The presence of large thrombus causes decrease in myocardial perfusion at microcirculatory level by embolization either spontaneously or during an attempt of PCI causing no flow(3). This causes severe adverse cardiac events including stent thrombosis.

So managing thrombus in STEMI cases appropriately during primary PCI is of utmost important as it is was linked to long term prognosis of a patient. Apart from anticoagulants and latest potent antiplatelet agents other methods like mechanical thrombus

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aspiration was advocated by some studies. However due to mixed results by larger studies on thrombus aspiration its routine usage is no longer indicated(4).

Alternative method which was suggested to reduce the burden of intracoronary thrombus is intracoronary delivery of thrombolytic agent in STEMI patients with large thrombus burden. Previous studies has shown that intracoronary thrombolysis dissolves thrombus in majority of cases with no bleeding complications(5).

Intracoronary thrombolysis in previous studies was attempted in cases with failure of mechanical aspiration of thrombus(6) and to facilitate the stenting in patients with large thrombus(7). In this case series we have demonstrated the usefulness of intra coronary thrombolysis in STEMI cases with large thrombus as a lone treatment without any attempt to mechanical aspiration in establishing coronary perfusion. In young STEMI patients(< 50 years) the culprit lesion frequently shows plaque erosion with thrombus rather than plaque rupture with underlying large atherosclerotic core. So in these patients if complete resolution of thrombus can be achieved with any treatment modality stenting can be avoided. This is the basis for the present case series where intracoronary thrombolysis was administered in young STEMI patients with large thrombus to achieve complete recanalization without need for stenting.

In the present case series seven patients with age ≤ 50 years who presented with acute STEMI and angiogram showing large thrombus were included. Large thrombus is defined as grade IV or grade V thrombus in TIMI Thrombus Grade(TTG) classification. After quantifying the thrombus one third of systemic dose of Tenecteplase(TNT) was given intracoronary and check angiogram was done after 24 hours to see the patency of the vessel.

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Time line

Table 1 Showing the clinical profile of patients who underwent intracoronary thrombolysis

S.NO	Age in years	Sex	DM	HTN	Current Smoker	STEMI Type	Access For CAG	Culprit artery	Thrombus (TTG) Grade	TIMI flow	Chest Pain onset to IC lysis time	Lytic agent	Check Angio	Bleeding
1	50	M	NO	NO	NO	AWMI	Radial	LAD	Grade IV	TIMI 1	180 minutes	TNT 15 mg	Complete recanalization	Nil
2	28	M	NO	NO	YES	AWMI	Radial	LAD	Grade IV	TIMI I	180 minutes	TNT 15 mg	Complete recanalization	Nil
3	30	M	YES	NO	YES	IWMI	Radial	LCX	Grade IV	TIMI II	240 minutes	TNT 15 mg	Complete recanalization	Nil
4	50	F	YES	NO	NO	AWMI	Radial	LAD	Grade IV	TIMI II	120 minutes	TNT 15 mg	Complete recanalization	Nil
5	30	M	NO	NO	YES	AWMI	Radial	LAD	Grade IV	TIMI I	60 minutes	TNT 20 mg	Complete recanalization	Nil
6	27	M	NO	NO	NO	AWMI	Femoral	LAD	Grade IV	TIMI II	120 minutes	TNT 20 mg	Complete recanalization	Nil
7	41	M	NO	NO	NO	IWMI	Radial	RCA	Grade IV	TIMI II	180 minutes	TNT 20 mg	Complete recanalization	Nil

DM-diabetes, HTN-hypertension, STEMI-ST elevation myocardial infarction, AWMI-anterior wall myocardial infarction, IWMI-inferior wall myocardial infarction CAG-coronary angiogram, TTG-TIMI Thrombus Grade, IC lysis- Intracoronary thrombolysis, TNT- Tenecteplase,

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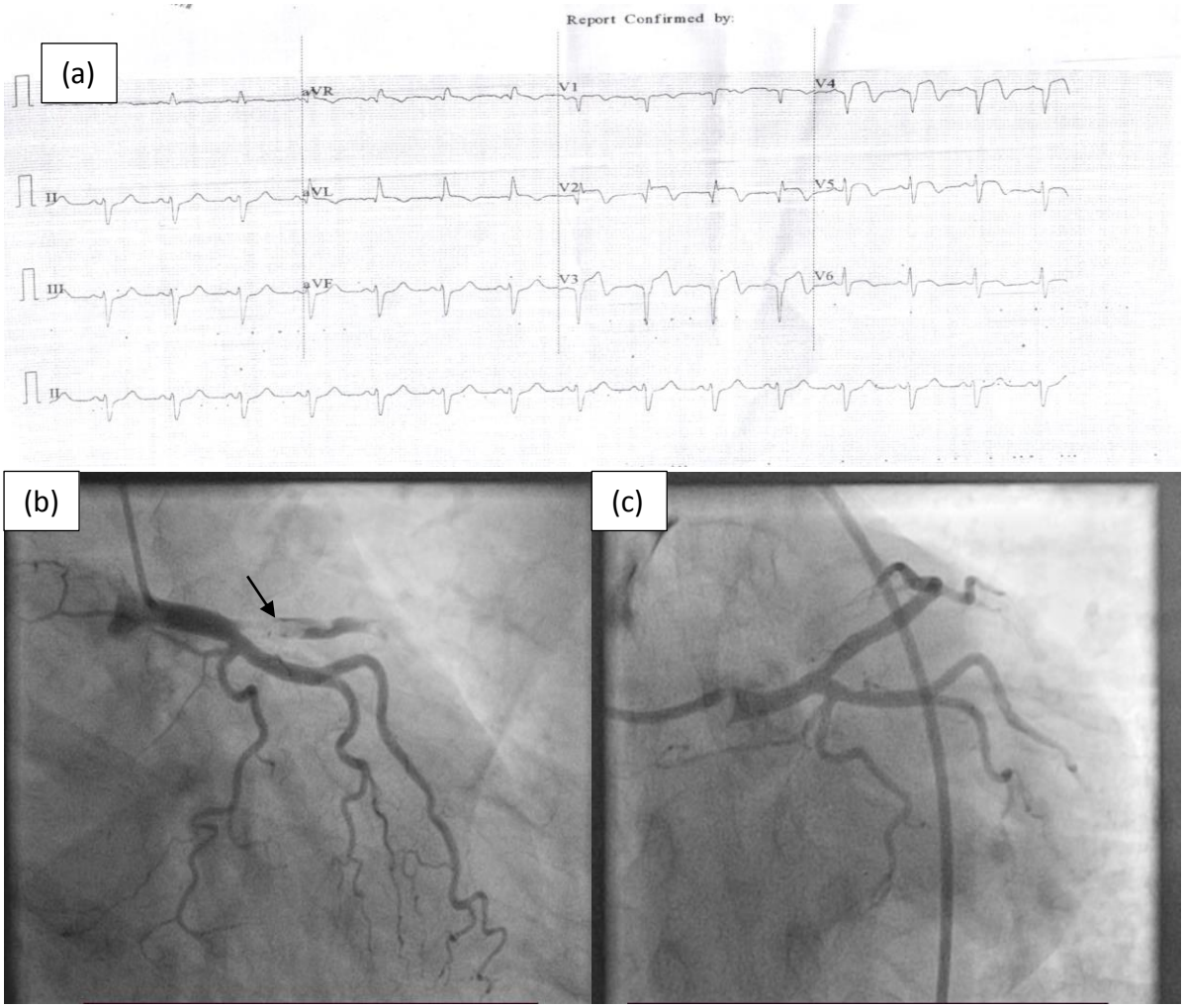
Case presentations

Case 1: A 50-year-old male with no comorbidities presented with acute anterior wall myocardial infarction as evidenced from ECG shown in Fig 1 (a) with ST elevation from leads V1 to V6. Coronary angiogram done from right Radial artery shows large TTG (TIMI Thrombus Grade) grade IV thrombus at ostioproximal left anterior descending artery (LAD) as shown in Fig 1 (b). In view of large thrombus 15 mg intracoronary Tenecteplase was given through 6F EBU guiding catheter. The time from onset of chest pain and intracoronary thrombolysis (IC) was 180 minutes. 0ne hour post lysis the patient became chest pain free and ECG shows ST resolution. Check angiogram done after 24 hours which shows complete recanalization without residual thrombus and significant stenosis as shown in Fig 1(c) avoiding need for stenting with no bleeding complications. Patient has completed six months follow up with no further major adverse cardiovascular events.

Fig:1



(a). ECG of a 50-year-old male showing ST elevation in leads V1 to V6 suggestive of anterior wall myocardial infarction.

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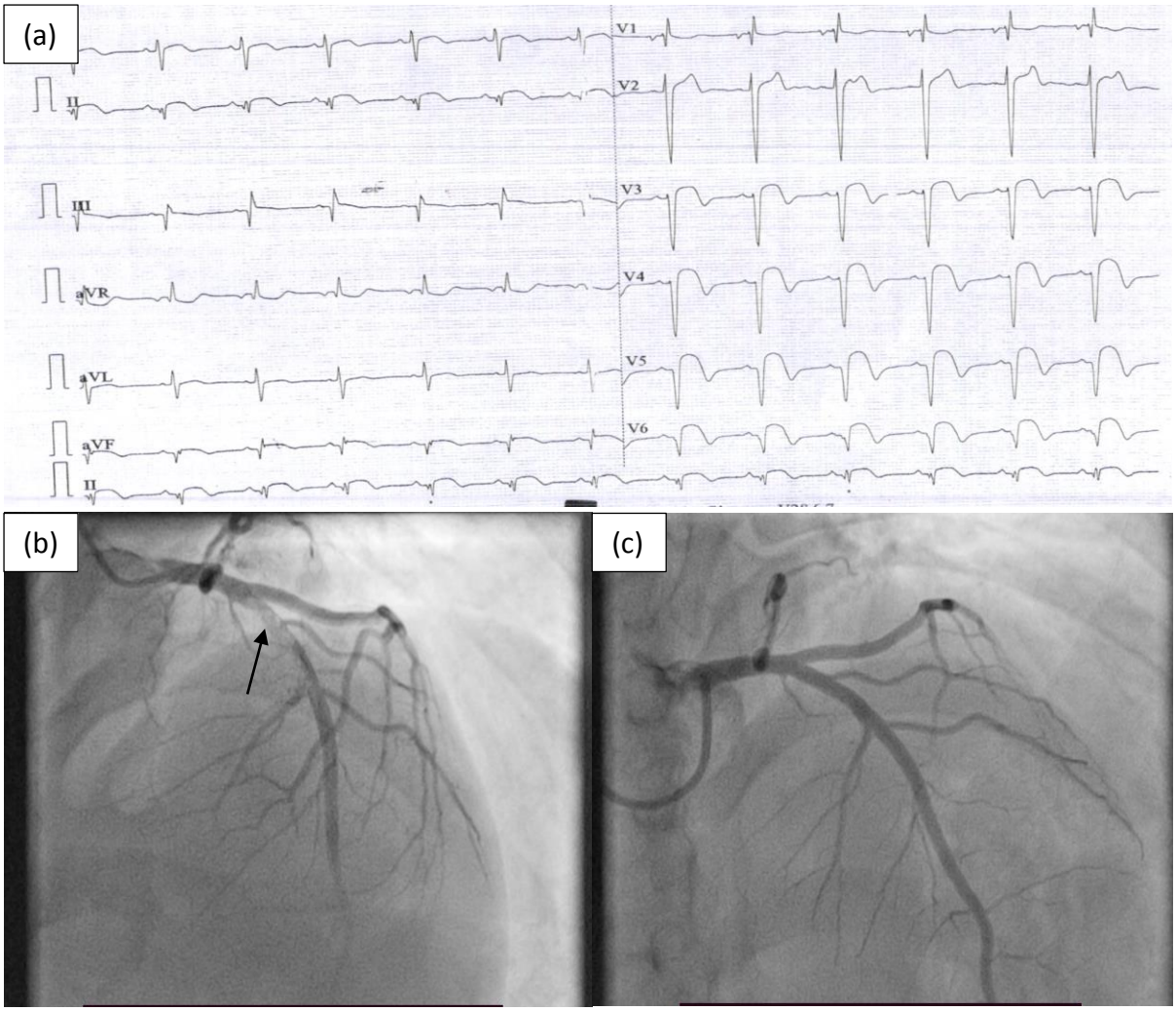
(b). Coronary angiogram showing grade IV thrombus in ostio proximal left anterior descending artery as indicated by black headed arrow

(c). Check angiogram after 24 hours of Intracoronary Tenecteplase showing complete recanalization without residual stenosis

Case 2: A 28-year-old male smoker presented with acute anterior wall myocardial infarction (AWMI) as shown in ECG Fig 2 (a). Coronary angiogram showed large thrombus in proximal LAD Fig 2(b). Intracoronary thrombolysis (IC) was done with 15 mg Tenecteplase through 6F EBU guide. The time from onset of chest pain to IC was 180 minutes. Check angiogram after 24 hours showed complete recanalization Fig 2(c) with no need of stenting. Patient completed one year of follow up with no major adverse cardiovascular events (MACE).

Fig 2:



(a). ECG of a 28-year-old male showing ST elevation in leads V1 to V6 suggestive of extensive anterior wall myocardial infarction.

(b). Coronary angiogram showing grade IV thrombus in proximal to mid left anterior descending artery as indicated by black headed arrow.

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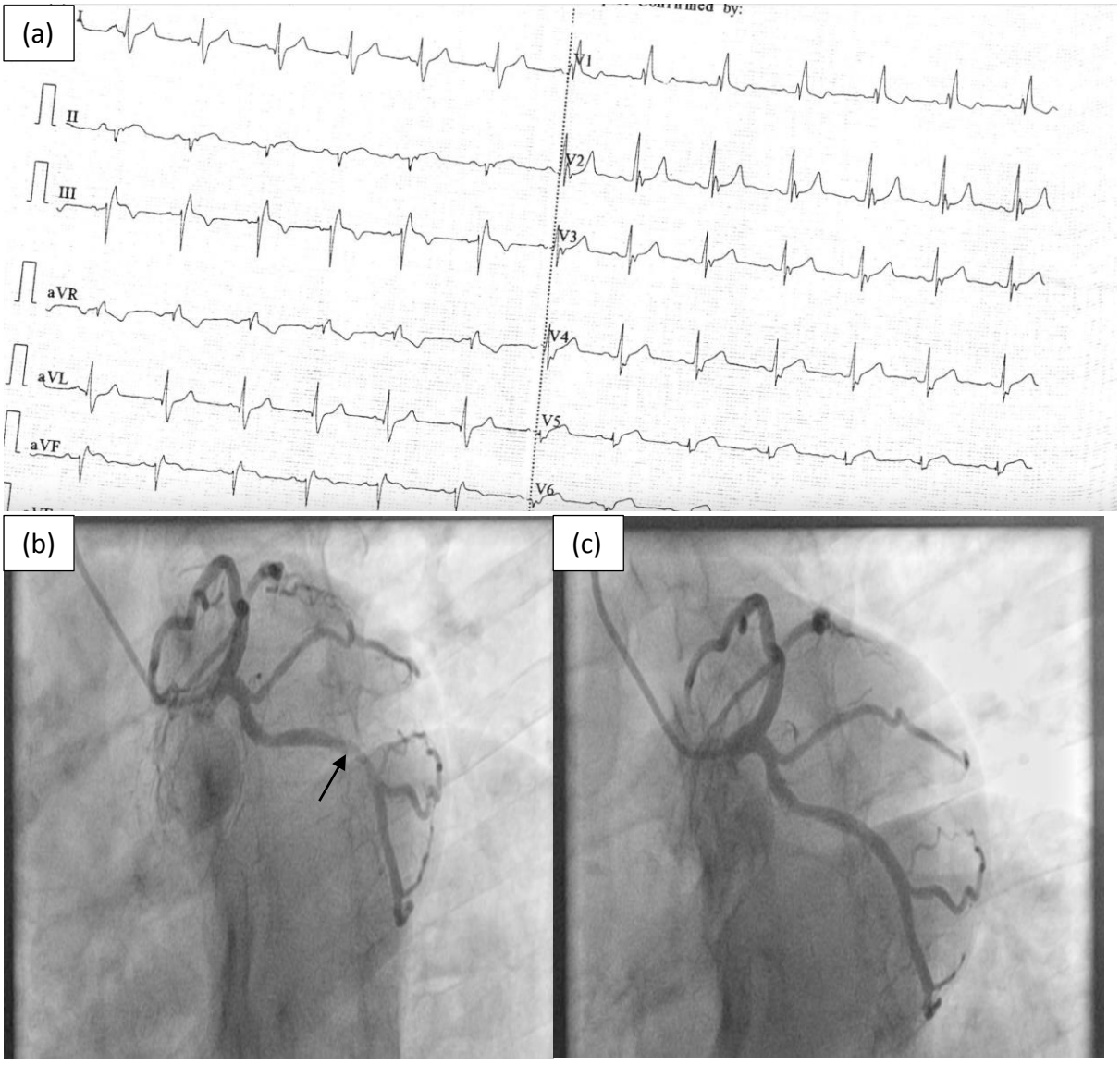
(c). Check angiogram after 24 hours of Intracoronary Tenecteplase showing complete recanalization without residual stenosis

Case 3: A 30-year-old male diabetic and smoker presented with acute inferior wall myocardial infarction. Coronary angiogram showed grade IV large thrombus in mid left circumflex artery Fig 3(b). IC was done with 15 mg Tenecteplase through guiding catheter after 240 minutes from the onset of chest pain with no bleeding complications. Check angiogram after 24 hours showed complete resolution of thrombus Fig 3(c) with no further stenting required. Patient has completed one year follow up with no MACE.

Fig 3:



(a). ECG of a 30-year-old male showing ST elevation in leads II, III, avF suggestive of inferior wall myocardial infarction.

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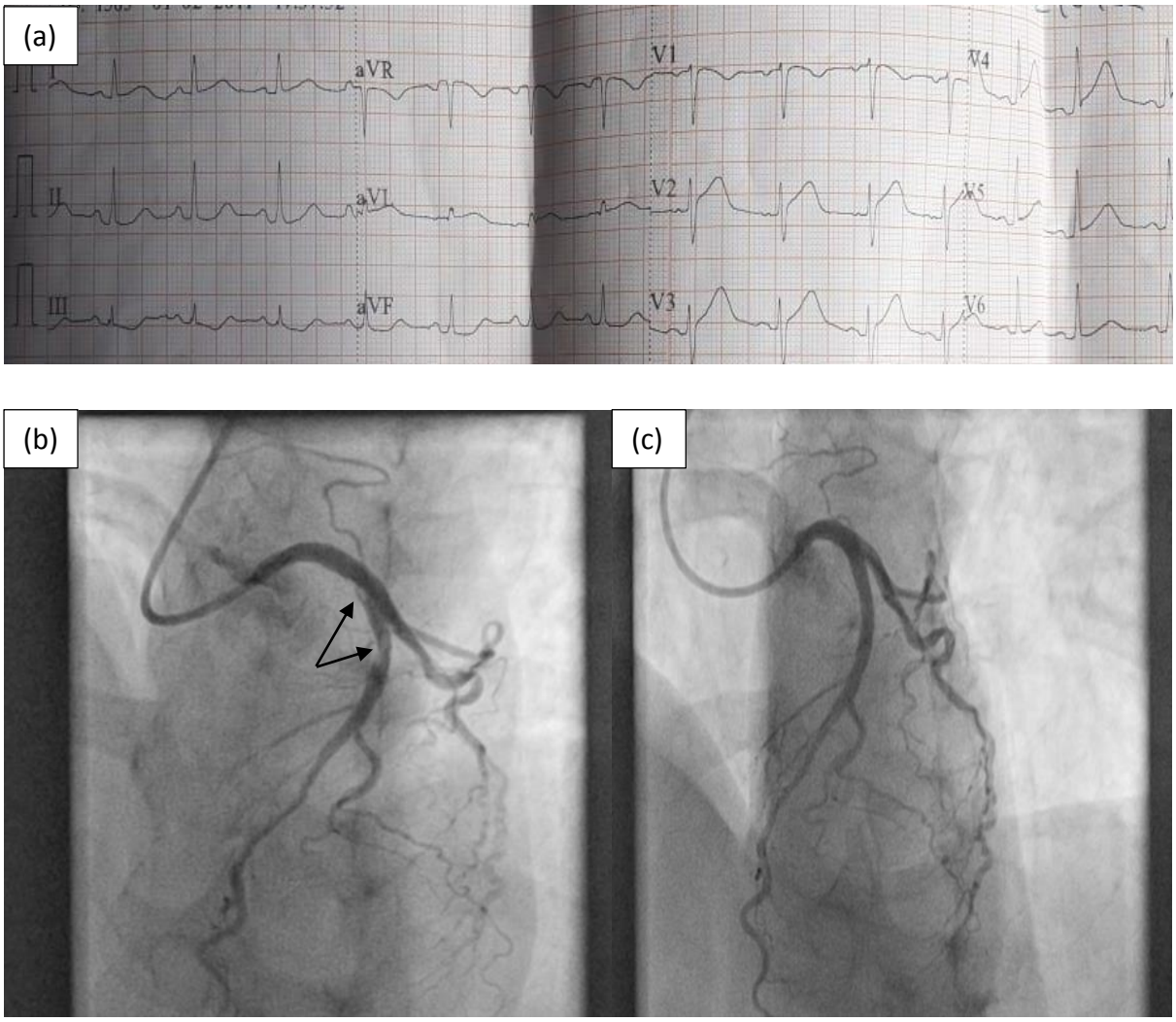
(b). Coronary angiogram showing grade IV thrombus in mid left circumflex artery as indicated by black headed arrow.
(c). Check angiogram after 24 hours of Intracoronary Tenecteplase showing complete recanalization without residual stenosis

Case 4: A 50-year-old diabetic female presented with acute AWMI as shown in ECG Fig 4(a). The coronary angiogram showed grade IV thrombus at proximal LAD Fig 4(b) which completely resolved Fig 4(c) after 15 mg IC Tenecteplase with no bleeding complications. Patient has completed six months of follow up with no further events on medical management.

Fig 4:



(a). ECG of a 50-year-old female showing ST elevation in leads V2 to V5 suggestive of anterior wall myocardial infarction.
(b). Coronary angiogram showing grade IV thrombus in proximal left anterior descending artery as indicated by double black headed arrow.

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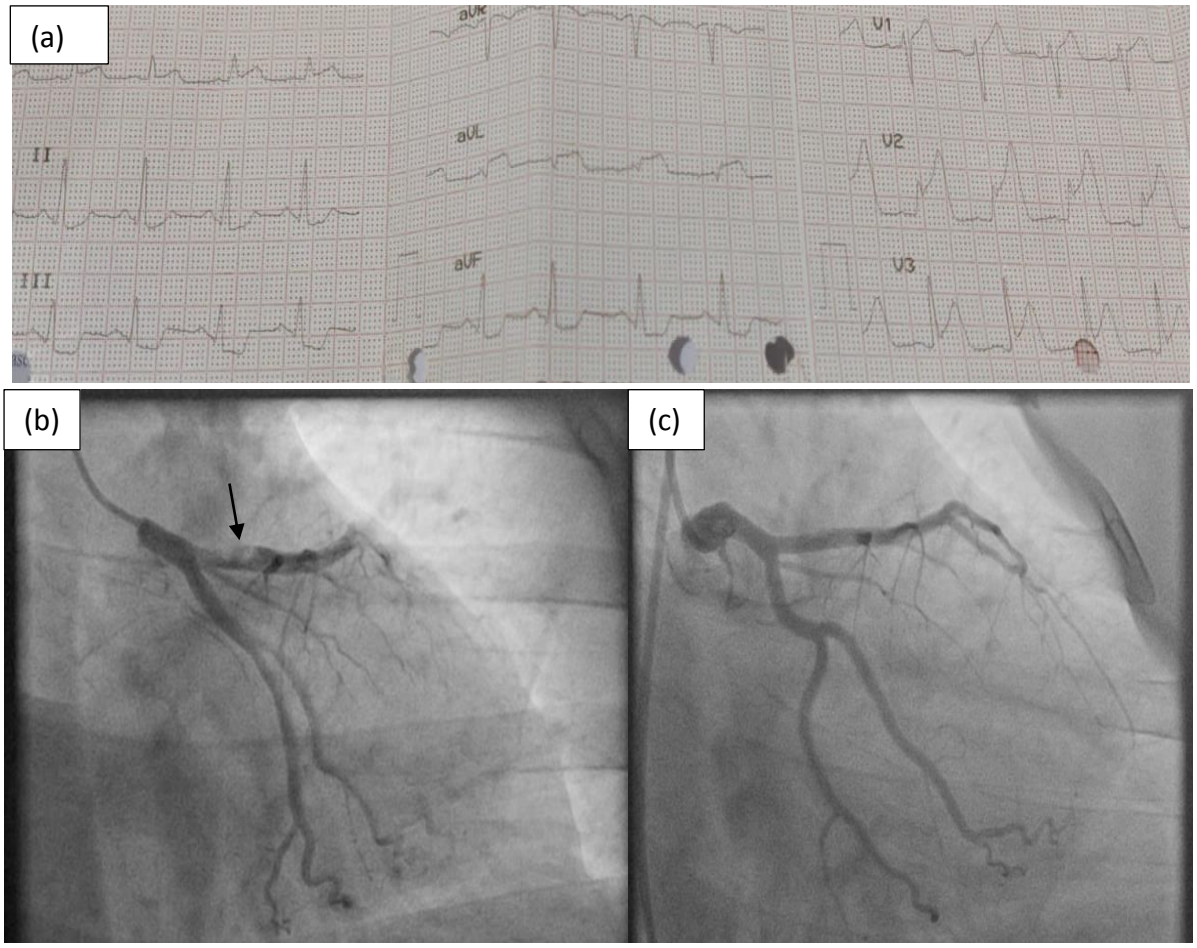
(c). Check angiogram after 24 hours of Intracoronary Tenecteplase showing complete recanalization without residual stenosis

Case 5: A 30-year-old male smoker presented with acute AWMI with ECG showing ST elevation in anterior leads Fig 5(a). Coronary angiogram showed grade IV thrombus at ostio proximal LAD Fig 5(b). Intracoronary thrombolysis was done with 20 mg Tenecteplase with in 60 minutes after onset of chest pain. Patient became chest pain free after 30 minutes with resolution of ST segment in ECG. Check angiogram showed complete recanalization of LAD Fig 5(c). Stenting was avoided in this young male with MI by IC thrombolysis.

Fig 5:



(a). ECG of a 30-year-old male showing ST elevation in leads V1 to V3 with reciprocal ST depression in inferior leads suggestive of anterior wall myocardial infarction.
(b). Coronary angiogram showing grade IV thrombus in ostio proximal left anterior descending artery as indicated by black headed arrow.
(c). Check angiogram after 24 hours of Intracoronary Tenecteplase showing complete recanalization without residual stenosis

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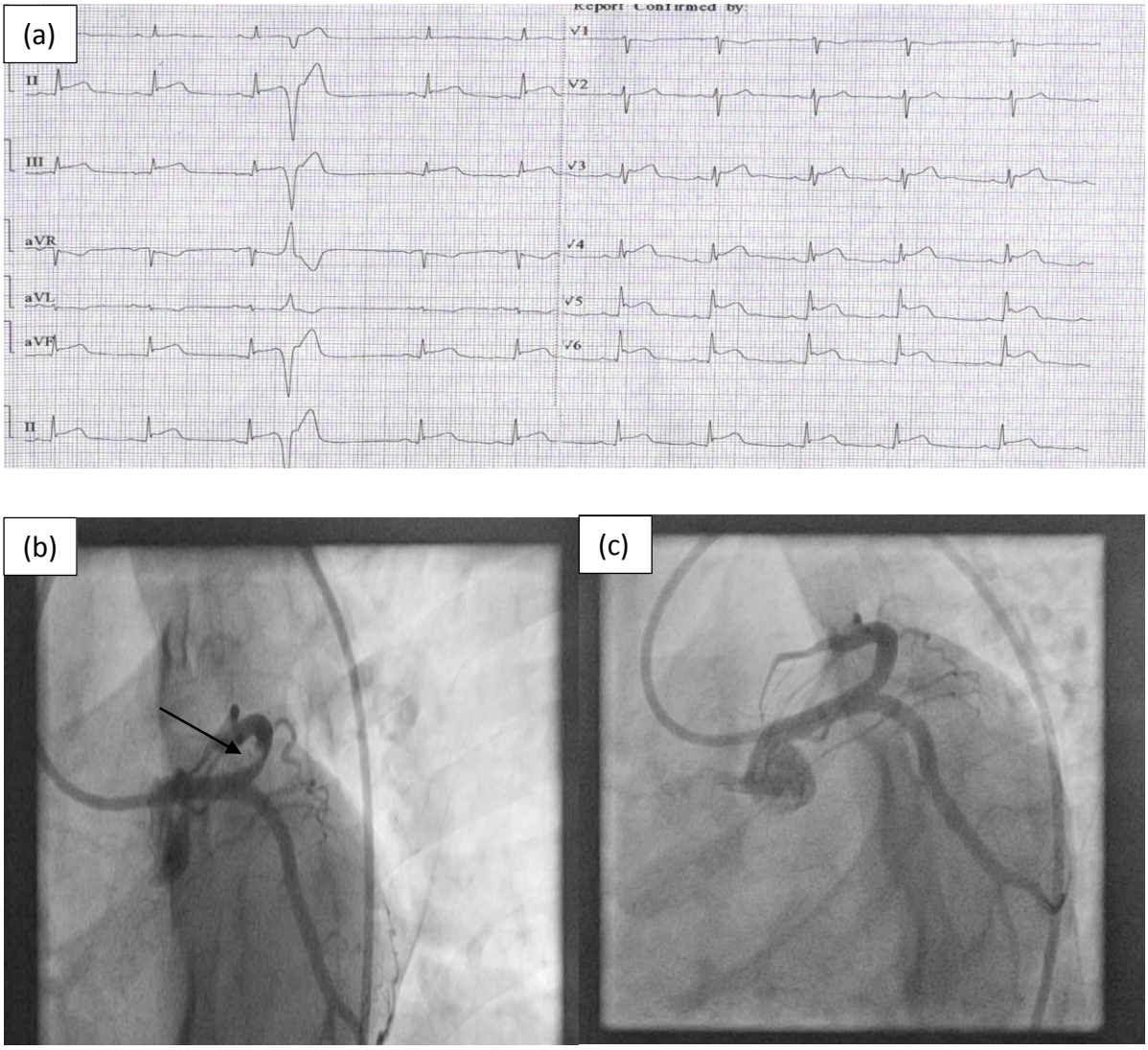
Case 6: A 27-year-old male with no comorbidities presented with acute AWMI. Coronary angiogram done through right femoral route showed grade IV thrombus at ostio proximal LAD Fig 6(b). Intracoronary thrombolysis was done with 20 mg Tenecteplase at 120 minutes after onset of chest pain. Check angiogram showed complete recanalization of LAD Fig 6(c) avoiding stenting.

Fig 6:



(a). ECG of a 27-year-old male showing ST elevation in leads V2 to V6 suggestive of anterior wall myocardial infarction.
(b). Coronary angiogram showing grade IV thrombus in proximal left anterior descending artery as indicated by black headed arrow.
(c). Check angiogram after 24 hours of Intracoronary Tenecteplase showing complete recanalization without residual stenosis

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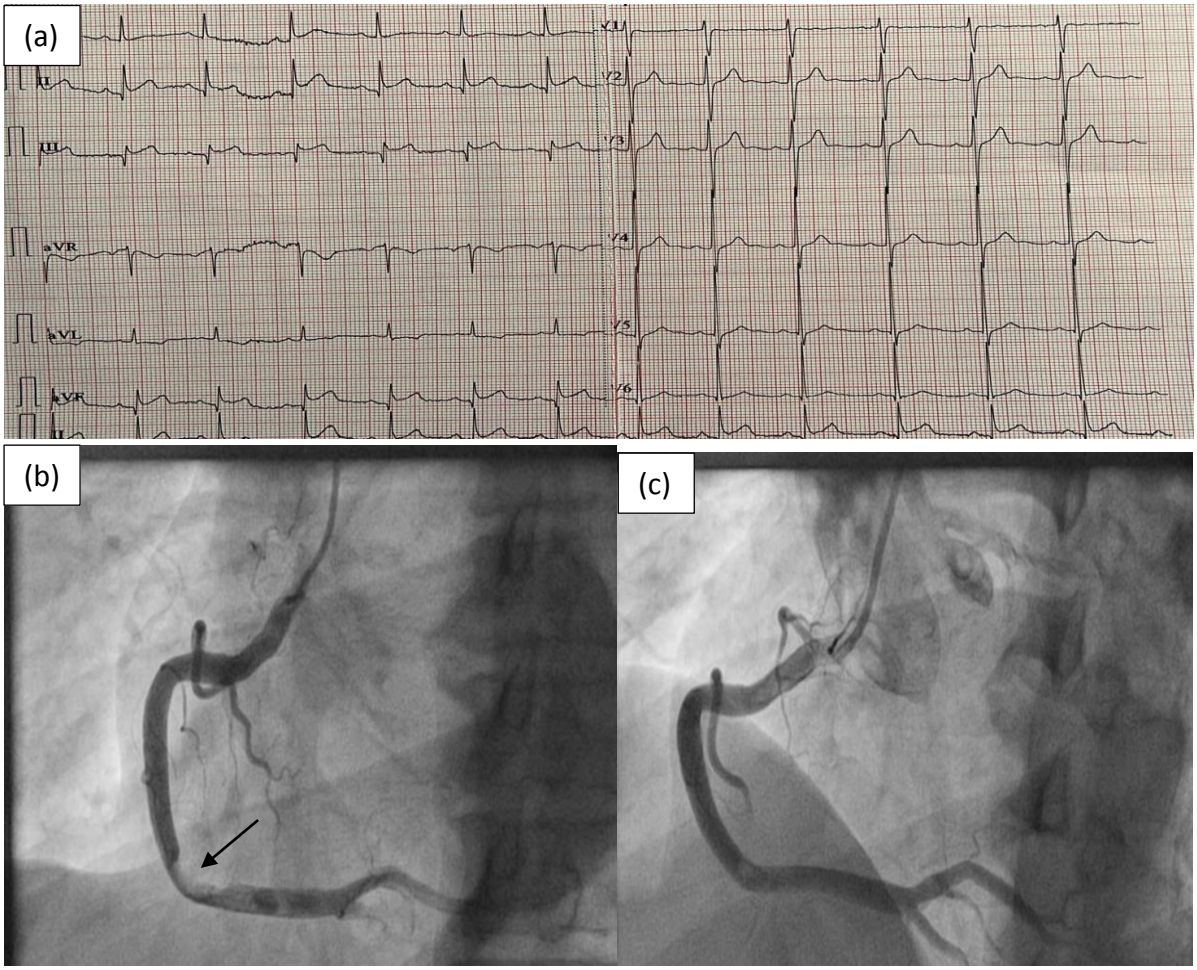
Case 7: A 41-year-old male with no comorbidities presented with acute inferior wall myocardial infarction (IWMI). Coronary angiogram showed grade IV thrombus at mid right coronary artery (RCA) Fig 7(b). Intracoronary thrombolysis was done with 20 mg Tenecteplase at 180 minutes after onset of chest pain. Check angiogram shoed complete recanalization of RCA Fig 7(c) not requiring any further stenting.

Fig 7:



(a). ECG of a 41-year-old male showing ST elevation in leads II, III, avF suggestive of inferior wall myocardial infarction.
(b). Coronary angiogram showing grade IV thrombus in proximal right coronary artery as indicated by black headed arrow.
(c). Check angiogram after 24 hours of Intracoronary Tenecteplase showing complete recanalization without residual stenosis

Discussion

We achieved successful recanalization in all the patients without need for stenting. Previous studies and case series on intracoronary thrombolysis differ in route of delivery of thrombolytic agent and the type and dose of thrombolytic agent. In the present case series one

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third dose of systemic dose of Tenecteplase was used for intracoronary thrombolysis and the drug was delivered directly through guiding catheter. Study by Xiao Y et al. showed that intracoronary thrombolysis in STEMI patients with large thrombus achieved greater myocardial microcirculatory perfusion when compared to manual aspiration of thrombus (8). Intracoronary thrombolysis can be used as an adjuvant therapy in STEMI patients for wiring the occluded coronaries and also in ectatic vessels studded with thrombus in acute coronary syndromic patients (9). Low dose intracoronary thrombolysis was given in STEMI cases with large thrombus in whom there is failure of manual aspiration for improving epicardial blood flow (10). Similar to the present case series study by Jayagopal et al. stated that low dose intracoronary thrombolysis in young STEMI patients with large thrombus can avoid the need for stenting by completely recanalizing the vessel (11).

Conclusion

Low dose intracoronary thrombolysis is reasonable option in establishing coronary blood flow in thrombotic occluded coronaries in young STEMI patients. Careful selection of patients and quantification of thrombus is important to achieve optimal results with no bleeding complications.

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