

LEFT MAIN CORONARY ARTERY CRITICAL STENOSIS



Mina Murray (Winona Ryder), feels the presence of a mysterious stranger closely following behind her on the crowded streets of London in 1897 - she suddenly swings around to confront this stranger and exclaims indignantly... "Do I know you sir!?"

"Bram Stoker's Dracula", Columbia Pictures, 1992

Having consolidated their victory over the great city of Constantinople just nine years previously the Turks in the year of 1462, had decided to extend their hegemony further into Europe. Since the shocking news of Constantinople's fall all Europe had trembled at the rumours of the vast armies at the disposal of Sultan, and wondered when he would make his next move. Initially the Turks were victorious everywhere, until they ran into a great Rumanian prince and warlord in the wild and untamed lands of Transylvania. Prince Vlad vowed to defend Europe and the Christian Church from the fierce invaders. His distraught wife Elisabetta who loved him very much begged him not to confront the Sultan, but Prince Vlad was clear what his duty was. He was the defender of his land and the Christian church. A great battle was fought and against all expectations Prince Vlad was victorious over the Turks. The Turks were terrible in their fury, but Prince Vlad was determined to outdo them with his own fury and to provide them a lesson they would never forget. He had thousands of Turkish prisoners impaled on large stakes driven into the ground. The Turks terrified of the prince they came to call, "Vlad the Impaler", fled the lands of Transylvania. A vengeful Turk, however, distressed at the treatment his countrymen had received fired an arrow carrying a message into the castle window of Prince Vlad's beloved wife, Elisabetta. This message falsely stated that the prince had been killed in battle. So distraught was Elisabetta was at this news, she flung herself out of the window and drowned in the moat far below.

When Prince Vlad arrived home to discover what had happened his grief was unbounded. His priests informed him that because Elisabetta had committed suicide, God had damned her for eternity. In his rage the Prince cried out, "Is this my reward for defending God's Church? I renounce God and the Church! I shall arise from my own death to avenge her death on humanity with all the powers of darkness". With these fearful oaths he drove his sword into the heart of a large Byzantine Cross as if to seal them in blood. And sealed in blood it so became - he was struck dead for his blasphemy, and condemned to a particularly nasty afterlife, a twilight world, never to be alive, but at the same time never to be dead and being forced to continue this "un-dead" existence by feeding off the blood of other living creatures. For four hundred years he existed in this miserable state, all the while searching for the condemned soul of his beloved wife, Elisabetta. Lost souls are sometimes given second chances, there was to none for Prince Vlad, but for Elisabetta there would be. Her soul re-entered the world in the late Nineteenth century, as Filomena Murray, a beautiful woman bequeath to her love, the young lawyer Jonathon Harker. As soon as her soul had been reanimated the tormented soul of Prince Vlad became aware of her. He would try to win her back to him no matter the cost; even if he had to condemn her to the same existence he endured himself for all eternity.

Mina, as she was known to her betrothed, was completely unaware of her past life as the wife of a great Rumanian Prince of the Fifteenth century - yet she was troubled by recurring disturbing dreams, and feelings of a mysterious and unsettling presence in her life she could not explain. Prince Vlad could take many forms, animals, mist, hideous beasts, disturbing hybrid forms of human and animal, but he could also take the form on occasions though with great energy required, of his once living form. It was in this form he decided to make contact with Mina and to get her to remember their past lives together and hopefully convince her to be with him for all time, even though it would mean that she had

to live the same monstrous existence as himself. On a crowded London street he finally confronts Mina. He drifts among the crowd to come close to her. Mina somehow feels his presence. She swings around to see a strangely dressed, yet elegant man of obviously noble disposition. She is quite taken aback and startled - he is a complete stranger, yet somehow he is not - he seems strangely familiar. "Do I know you sir", she indignantly exclaims!

The above account is the original version of the story of Count Dracula, which was written by Bram Stoker in 1897. It is a story at once familiar to us all but at the same time totally unfamiliar. This is because of the horrendous Hollywood butchering Stoker's story has taken over the years, and it is the stereotyped farcical versions of his story which have turned it into a complete parody. That is until Columbia picture's, beautiful and visually stunning retelling of the tale in 1992 - faithful to the original story. Bram Stoker's novel is actually a masterpiece of literature, a quite poignant love story of two condemned lost souls trying desperately to find each other again in their hellish afterlives. And instead of the usual Hollywood depiction of horrific blood thirsty endings to the tale, in Stoker's original work, the ending is actually uplifting. The Prince does not force his existence onto Elisabetta, but offers her a choice. When she remembers her past life, she gladly accepts the terrifying conditions under which she must live, in order to be reunited with her husband. But in the end the Prince loves her so much, he cannot allow her to agree, and decides to leave her forever. In the best tradition of "love conquers all", the magnificent self-sacrificing gestures of both lovers, lifts the horrific curse from the Prince and he is released from his hellish existence and dies peacefully a second time - but perhaps with the implication of one day being reunited again with his wife under a more heavenly existence.

When we examine the ECG of patients presenting with acute coronary syndromes, we usually do so with scant attention to one lead in particular - aVR! This lead remains like the lost soul of Prince Vlad in the background, unfamiliar to us, yet somehow like Mina's disturbing dreams we still sense it is there - we just don't know its true meaning! When we see isolated ST elevation we are at a loss to explain it even though this pattern should be quite familiar to us, we exclaim... "Do I know you sir!?" Well we ought to, as ST segment elevation in this lead, has just as vital clinical significance as ST segment elevation elsewhere, and, like Mina, we just need to be able to interpret the signs correctly! In the setting of associated ST segment elevation in lead I, and ST segment depression elsewhere, an urgent referral to the interventional cardiologist is warranted - the hidden message these signs give us is that of a critical stenosis of the left main coronary artery. Just as Mina faced, so we face a sinister prospect, however by good decisions such as timely angiography we may also hope for a more joyous ending!

LEFT MAIN CORONARY ARTERY CRITICAL STENOSIS

Introduction

Left main coronary artery occlusion leads to very extensive myocardial infarction and often death.

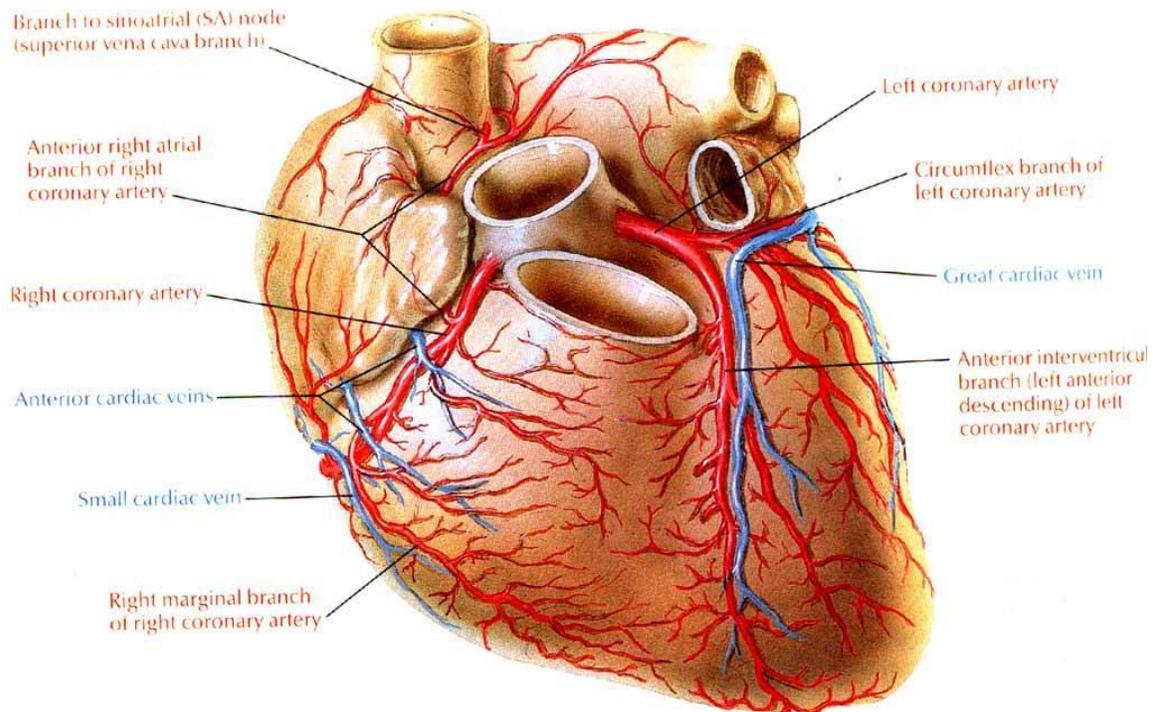
Just as a series of characteristic ECG changes can predict the presence of a critical stenosis of the LAD, (see **Wellen's Syndrome Guidelines**), so too can a series of characteristic ECG changes predict the presence of a critical stenosis in the *even more proximal*, **left main coronary artery**.

LMCA critical stenosis (just as a critical stenosis in the more distal region of the LAD) has high mortality without timely intervention with PTCA or CAGs, and so is extremely important to recognize.

Included in these ECG changes are changes seen in the *often neglected* ECG lead of **aVR**.

Recognition of the ECG changes that suggest a critical stenosis of the left main coronary artery mandates urgent referral to an interventional cardiologist, with a view to urgent/ timely coronary angiography followed by angioplasty or CAGs.

Anatomy



Anatomy of the coronary artery circulation. Note the left main coronary artery supplies both the LAD and the circumflex arteries and so infarction in this region will have devastatingly extensive consequences for the myocardium.

ECG Features

The importance of ECG lead aVR:

aVR has been described as the “forgotten lead” in ECG recordings.

ST segment elevation in aVR is often ignored as just being a “reciprocal change”; however it does have two important diagnostic utilities:

- In toxicology, where certain changes in the aVR lead may indicate fast sodium channel blockade.

See separate Tricyclic Antidepressant overdose Guidelines

- In cardiology where certain changes in the aVR lead may indicate a left main coronary artery critical stenosis.

The ECG features of a critical stenosis of the left main coronary artery:

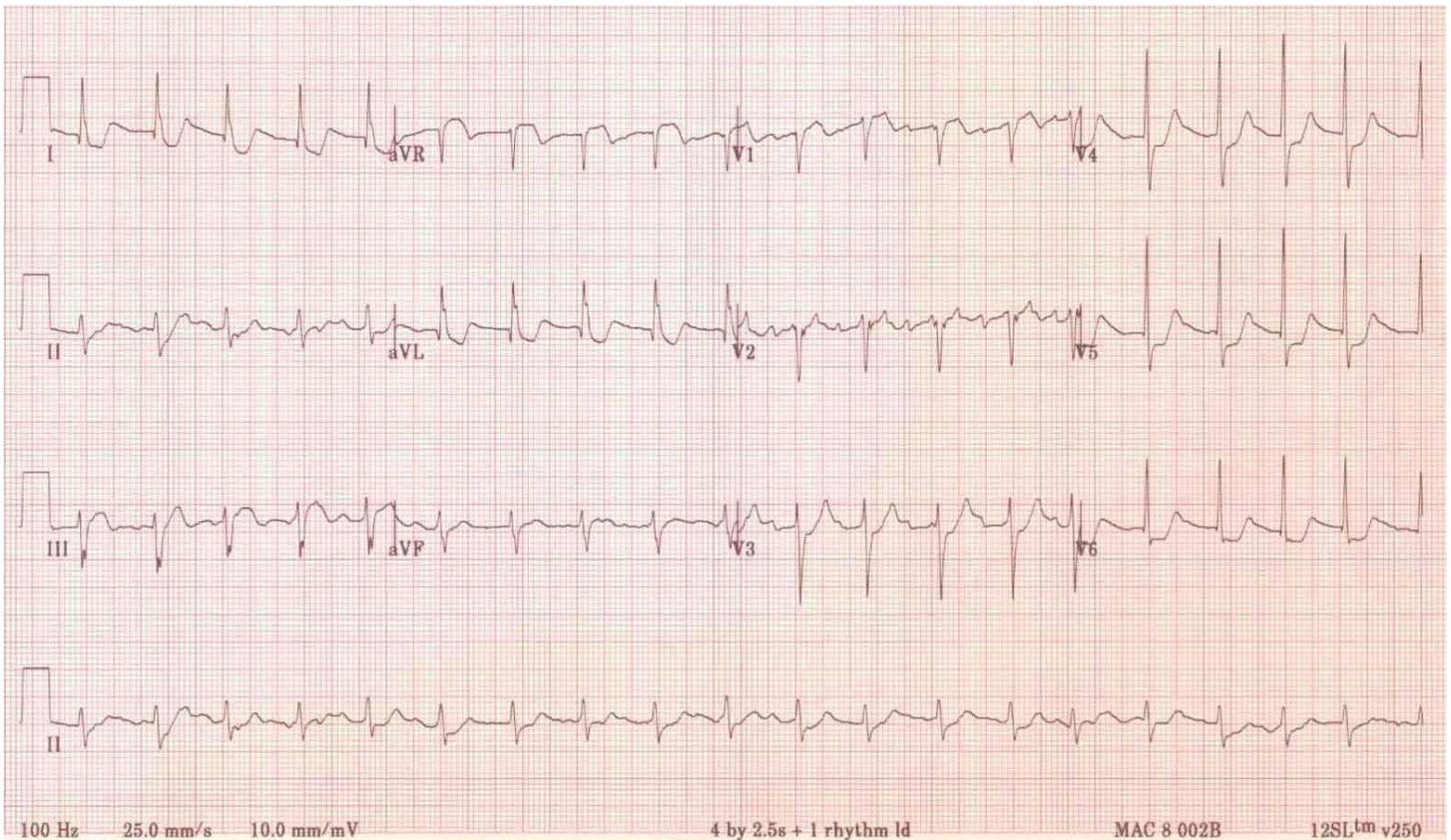
The ECG features in a patient who presents with an acute coronary syndrome, that suggest a **critical stenosis of the left main coronary artery** are:

- **ST segment elevation (> 1 mm) in aVR, (especially when in greater magnitude compared to the associated ST segment elevation shown in V1)**
- **ST segment elevation (> 1 mm) in V1**
- **Associated ST segment depression in other leads, (either inferior, anterior or both)**

It is important to note that these ECG changes are also characteristic of widespread triple vessel (right coronary artery, left anterior descending artery and circumflex artery) disease.

Note that in contrast to the ECG changes of Wellen's syndrome which occur in *pain free periods*, the ECG changes of a critical stenosis of the left main coronary artery occur *during pain*.

Patients who present with an acute coronary syndrome and who have ST segment depression are not candidates for urgent coronary angiography by conventional criteria of ST segment elevation in 2 or more contiguous ECG leads, however when there is associated ST segment elevation of lead aVR and lead V1, then urgent angiography is indicated on the basis of impending massive infarction from a critical stenosis of the left main coronary artery (or from extensive triple vessel disease)



ECG showing the typical ECG changes suggestive of a critical stenosis of the left main coronary artery. There is ST segment elevation in aVR and V1, as well as associated ST segment depression in leads V5-6.

Management

For patients suspected of having this syndrome indicating a critical proximal stenosis of the left main coronary artery:

1. Control any ongoing or recurrent episodes of pain with usual regimes of morphine and nitrates as required.
2. Give aspirin 150 mg.
3. Clopidogrel is probably best avoided in the first instance, in case urgent CAGS is required.
4. Commence anticoagulation therapy;
 - IV heparin is preferred to clexane, in the first instance, in view of the need for urgent angiography.
 - Clexane may be given after discussion with the cardiologist concerning the timing of angiography.

Disposition

All patients suspected of having a critical stenosis of the left main coronary artery should:

- Be admitted for continuous 12 lead ECG monitoring.
- Be referred **urgently** to the **Interventionist Cardiologist** on call, with a view to **early/urgent coronary angiography**.

References

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Dr J. Hayes
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