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Case Report

Late perforation of Durata ICD lead – A case report



Bharati Das ^{a,*}, Sachin Yalagudri ^a, S. Maiya ^b, Sunita Abraham ^c,
J. Kannan ^c, Ravi Kishore ^d

^a Fellow Electrophysiology, Narayana Hrudayalaya, Bengaluru 560099, India

^b Consultant Paediatric Cardiologist, Narayana Hrudayalaya, Bengaluru 560099, India

^c Consultant Cardiologist, Narayana Hrudayalaya, Bengaluru 560099, India

^d Head Electrophysiology and Arrhythmia Services, Narayana Hrudayalaya, Bengaluru 560099, India

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ABSTRACT

Late ICD lead perforation is an uncommon but clinically significant complication. The pathophysiology, predictors, clinical presentations and management although have been described earlier but still remain inconclusive. Our case highlights the challenges involved in clinical recognition, the value of CT scan in its diagnosis and need for careful management of this potentially life threatening condition. It is the first report on Durata lead perforation to the best of our knowledge.

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1. Case

A 70 year old gentleman underwent ICD implantation through left subclavian vein approach (St Judes, single chamber, model-Fortify STVR, CD 1235-40Q, with Durata active fixation lead. One month post procedure he presented with clinical features suggestive of thoracic outlet syndrome. The same was confirmed by Doppler study and CT angiogram of upper limb arteries. CT angiogram showed occlusion of right subclavian artery, brachial, radial and ulnar artery (Fig. 1). Pre operative chest radiograph showed bilateral cervical ribs, mild pleural effusion on left side (Fig. 2) and ICD lead in position. Echocardiogram showed ICD lead in situ with no pericardial effusion and ICD interrogation was normal.

He underwent right cervical rib excision with right subclavian artery interposition graft. Post operative serial chest

radiographs showed mild pleural effusion on right side which improved gradually but there was increment of pleural effusion on the left side and the ICD lead was in position. As patient developed shortness of breath, left pleural tapping was done which showed hemorrhagic collection and on advice of pulmonologist no further active intervention was done.

However pre-discharge ICD interrogation found loss of capture and intermittent sensing failure. Echocardiogram showed minimal pericardial effusion anterior to RV and endocardial lead in situ. Fluoroscopy image of ICD, when compared with implantation time showed displacement of lead tip. CT scan of the thorax (Fig. 3) showed perforation of ICD lead in to the pericardial space with small haematoma surrounding it and pleural effusion on left side. With surgical back up, repositioning of the ICD lead was done in hybrid lab by percutaneous transvenous approach with gentle traction

* Corresponding author.

E-mail addresses: bharathidas15@gmail.com, brmohapatra2@rediffmail.com (B. Das).

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Fig. 1 – CT angiogram upper limb delineating outlet obstruction due to right cervical rib.

from the tract and screwing it to another site on the septum with acceptable parameters. There was no further increase in pericardial effusion or pleural effusion. He was discharged with these findings. His follow up visits showed gradual resolution of the pericardial and left pleural effusion and improvement in symptoms.

2. Discussion

Cardiac perforation after pacemaker or ICD implantation is an infrequent complication. The rate of lead perforation are 0.1–0.8% after pacemaker implantation and 0.6–5.2% after ICD implantation.^{1–3} But there is a large group of clinically



Fig. 2 – Pre op CXR—bilateral cervical rib, mild pleural effusion (Left).



Fig. 3 – CT scan VR image, anterior oblique view confirming perforation of RV apex by ICD lead.

silent perforations 15%, which was diagnosed accidentally during CT scan performed for other indications.⁴

Incidence of perforation is higher for some lead models. The incidence of Riata lead perforation ranges from 0.34⁵ to 2.5% <http://europace.oxfordjournals.org/content/11/2/255.full-ref-3>.⁶ A single centre study over a period of 1 year showed increasing number of perforation in Riata leads (models 1580, 1581, 1590, 1591) when compared to Medtronic sprint fidelis leads 3.8% vs 0%.⁷ However a 4 year study done under 4 different universities in USA, showed similar perforation rates across all lead make and models (0.53% in Medtronic sprint fidelis and 0.65% in Riata leads, 0.51% Guidant/Boston scientific).⁸ Comparison of incidence of delayed cardiac perforation reported in various leads in a single centre with a 6 year follow up were Riata-2.5%, fidelis-1% and 0% with Durata lead (St Judes new generation ICD lead).⁹ Another study reported the incidence and time of occurrence of this complication with Riata leads, the incidence was 2.6% (1580/1581) series, 2.2% (7000/7001) series, no case with (1590/1591) series. In all cases perforation occurred within 6 weeks post-implantation period.¹⁰ Perforation was related to a) operator factors b) characteristics of the lead i.e. lead stiffness, tip diameter, forward pressure, insulation material and is more with active fixation than passive fixation^{11,12} c) patient related factors. There was even concern about potential danger of the Riata lead in the lay press.¹³

The clinical presentations of perforated ICD lead may be acute (within 24 h), sub acute (within 30 days) or late (more than 30 days). Patients may present as chest pain, dyspnoea, hypotension, syncope, cardiac failure, abdominal pain, pericardial effusion, cardiac tamponade, pleural effusion, inappropriate ICD shocks, muscle or diaphragmatic stimulation and hiccups due to phrenic nerve stimulation.¹ The predictors for lead perforation are use of corticosteroid, anticoagulation, low body mass index, older age, active fixation lead, smaller diameter lead, RV apex than RV septum or RVOT, number of ICD shocks, chest trauma.¹

Chest radiograph is most commonly used imaging modality to diagnose the lead perforation by analysing lead tip position and lead curvature. It is easier to diagnose when the lead tip is outside the cardiac shadow and difficult when the signs are subtle. Lead evaluation becomes complex in the

presence of pleural effusion, pericardial effusion, pneumothorax. Transthoracic echo is very simple, bedside tool which helps for the diagnosis and monitoring the pericardial effusion dynamics. Depending on the site of perforation there may be abnormalities in sensing or capturing on ICD interrogation but normal function cannot exclude cardiac perforation.⁴

Though ICD system interrogation, chest radiograph, echocardiogram are helpful in detecting ICD lead perforation, computerized tomography with multidetector scanners using cardiac protocols remains the gold standard.^{4,14} The site of perforated ICD lead tip can be visualized by CT scan in the pericardial space, extracardiac free space, mediastinum, lung and in chest wall muscles. The sensitivity and specificity of the tests are still not available due to paucity of systematized studies.

Various reports showed that most of the migrated leads could be removed safely by simple traction under fluoroscopy and or by transesophageal echo monitoring.¹⁵ The additional techniques like use of excimer laser sheath can be utilized for better success rate.^{16,17} Surgical back up may be used if the clinical scenario is compelling.¹⁸ Post procedure haemodynamic and echocardiography monitoring is mandatory because of recurrence of pericardial effusion.

In our patient, there was preoperative minimal left sided pleural effusion which increased post operatively. This favours that the perforation process must have started before the surgery. Pleural effusion may be caused by irritation of the pleura by the lead tip. So, the surgical procedure might not have any direct contribution to the complication. However our hypothesis is that use of anticoagulant preoperatively and subjecting the patient to different positions for investigation might have enhanced the process of perforation.

3. Conclusion

ICD lead perforation may present with various symptoms but the associated clinical condition can mask it or make it more difficult to diagnose and one needs to have high degree of clinical suspicion. Many a times chest radiograph may be inconclusive and normal ICD parameters do not rule out ICD lead perforation. So, the CT scan of thorax should be done earlier in situations with high possibilities of lead displacement along with close observation. It is the first report on Durata lead perforation to the best of our knowledge.

Conflicts of interest

All authors have none to declare.

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