

Restoring patency of central venous port-catheter with low-dose thrombolysis



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Background

The central venous portcatheters are used for long-term intravenous application of various drugs. Most often indication for venous port system insertion is administration of chemotherapy. The most frequent complications are thrombotic and infection. Thrombotic complications are associated with port dysfunction, which is presents as difficult aspiration and infusion through the portsystem. Thrombotic complications can be devided into two groups – the first is related to the port catheter (fibrin sheath, intraluminal thrombosis of catheter or port chamber, thrombus on the catheter tip) (Fig 1, 2) and the second group is related to venous thrombosis (partial or complete). Local low dose thrombolysis with usage of recombinant alteplase (recombinant tissue plasminogen activator rtPA) or urokinase was described as effective treatment for thrombotic complications like intraluminal thrombosis, fibrin sheath and thrombus on the catheter tip. In the literature, the protocols of thrombolytic agent administration are described as single injection or short time infusion with technical success between 77–97 %. Incidence of procedural complication is very low. In some countries there is not commercially available small 2.2 mg alteplase dosage (Cathflo Activase, Genentech, USA), therefore some centres use frozen alteplase.

Purpose

To report a retrospective single center experience with low-dose thrombolysis of central venous port catheters using cryopreserved solution of recombinant tissue plasminogen activator (rt-PA).

Materials and Methods

From September 2008 to December 2019 we implanted 5554 central venous port-catheters and performed low-dose thrombolysis 294 times in 258 patients (63 males, 195 females, age from 19 to 79 years, mean 55 years) for port-catheter dysfunction. One hundred fifty one patients were treated for solid tumor, 85 for hematologic malignancy and 22 patients for non-malignant disease (cystic fibrosis, bronchial asthma, hypoparathyroidism). Thrombotic port-catheter dysfunction was confirmed by digital subtraction angiography. After angiographic confirmation, low-dose thrombolysis was performed using cryopreserved solution of rt-PA (Actilyse, Boehringer Ingelheim, Germany). The administration protocol includes 1–2 mg bolus which was followed by infusion 50 ml solution of 3 mg alteplase. Infusion time was 2 or 3 hours (17 ml or 25 ml/hour). After infusion, the the port catheter function was checked. In case of restored blood aspiration through the port needle, the catheter was flushed with saline. Thrombolytic agent was prepared under sterile condition in the hospital pharmacy. One vial of twenty milligrams of rt-PA was diluted in 20 ml solution, which was divided to 5 mg (from September 2008 to April 2014) or 4 mg (from May 2014 to December 2019) equal amounts and frozen at -20°C (Fig 3a, 3b). We used only one dose of frozen solution of thrombolytic agent for each thrombolysis.

Results

Mean dose of alteplase for thrombolysis was 3.5 mg (range from 1 mg to 5 mg). Successful restoration of port-catheter patency was 90.8 % (267/294). We recorded 7 (2.4 %) procedural complications (Tab 1). One major adverse event was observed in a patient with polyvalent allergy. Two patients had shiver, two nausea and two had faintness.

Conlusion

Low-dose thrombolysis using cryopreserved rt-PA is very cost-effective method for patency restoration of central venous port catheter with acceptable complication rate.

Figures

Fig 1.: Digital subtraction angiography shows fibrin sheath (sleeve) around the distal part catheter of port system (blue arrowhead).

Fig 2.: Thrombus in the port-catheter's chamber (blue arrowhead)

Fig 3a.: The small sterile syringe with solution of 4 ml alteplase (Actilyse). The concentration of the thrombolytic agent is 1 mg in 1 ml.

Fig 3b.: The syringe is wrapped in double pack and stored in a refrigerator at -20°C. The expiration date is 6 months.

Fig 4a: 76-year old woman with central venous port dysfunction (blood aspiration is not possible) 6 months after implantation. Digital subtraction angiography revealed fibrin sheath around the catheter.

Fig 4b: Digital subtraction angiography after successful local low dose thrombolysis. The thrombolytic protocol included bolus of 1mg alteplase and 2 hours infusion of 3 mg alteplase. The port-catheter is fully patent.

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	9/2008–4/2014	5/2014–12/2019	9/2008–12/2019
thrombolysis	74	220	294
patients	66	192	258
solid malignancy	37	114	151
hematol. disease	21	64	85
non malignant disease	8	14	22
major complication n (%)	0 (0 %)	1 (0.5 %)	1 (0.5 %)
minor complication n (%)	4 (5.4 %)	2 (0.9 %)	6 (2.6 %)
total complication n (%)	4 (5.4 %)	3 (1.4 %)	7 (2.4 %)
primary patency n (%)	68/74 (91.9 %)	199/220 (90.5 %)	267/294 (90.8 %)

