



# Radiology Implanted Forearm Ports: A Review of the Literature

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## Abstract

**Background:** Insertion of totally implanted venous access devices; that is, port systems, in the forearm is an option for long-term venous access. To better understand the radiology literature reported for this anatomic location, we performed a search for, and an analysis of, previous publications related to forearm implantation of these devices by interventional radiology department personnel.

**Materials and Methods:** A review of the literature was performed for articles describing radiology implantation of forearm ports. Articles published between 1990 and 2015 were reviewed.

**Results:** Eleven articles were found that met the review criteria. None were randomized studies and only 1 was a prospective study. All of the other studies were retrospective reviews of a variety of different port devices. An analysis of these articles was performed.

**Conclusions:** Forearm port implantation had high technical success rates (range, 98%-100%; mean, 99.7%). A wide variety of complications were encountered, none of which exceeded the Society of Interventional Radiology threshold levels for complications associated with port insertion. A subset of the studies were upper arm venipunctures with the port catheter and housing subsequently implanted in the forearm distal to the antecubital fossa.

**Keywords:** central venous, catheter, totally implanted venous access device, venous port, implantable port, venous access port, port catheter, radiology, interventional radiology, forearm

## Introduction

Interventional radiologists, and interventional radiology departments, have become more involved in the insertion of venous access devices, particularly totally implanted venous access devices (TIVAD), also known as ports or port systems. First developed in 1982, TIVADs allow for the

administration of chemotherapy, antibiotic therapy, parenteral nutrition, and recurrent blood sampling or transfusion.<sup>1</sup> TIVADs are safe and effective venous access devices for many patients who require long-term, intravenous therapy. They have also been shown to have long-term durability.<sup>2</sup>

TIVADs can be implanted in the upper chest, the arm, and the forearm. Each site has different possible complications. Chest ports are associated with the possible risks of pneumothorax, hydrothorax, and carotid or subclavian artery cannulation. Arm port TIVAD insertions do not expose patients to the possibility of these complications, but inadvertent brachial artery and median nerve injury are possible. The forearm, that is, the area distal to the antecubital fossa, is an anatomic option for TIVAD insertion.<sup>3-13</sup>

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**Table 1. Technical Elements of the Manuscripts Reviewed**

Reference	Venous access	Port type (n)	Catheter	Antibiotics	Age range (y)	Number of ports	Technical success rate (%)	Catheter indwell-days (mean)	Total catheter-days
3	Palpation	PAS <sup>a</sup>	Polyurethane	Yes	NR	32	100	39-488 (NR)	6225
4	Venography	PAS <sup>a</sup>	Polyurethane	Yes	26-84	118	100	40-220 (161)	24,151
5	Venography	Vital Port Mini Titanium <sup>b</sup>	Silicone	Yes	33-78	32	100	3-445 (90)	2878
6	Venography	PAS <sup>a</sup>	Polyurethane	Yes	12-92	105	100	5-459 (88)	9124
7	Palpation	Healthport MiniMax <sup>c</sup> (76)	Polyurethane	NR	22-87	100	100	0-597 (90)	12,688
		PAS <sup>a</sup> (22)	Polyurethane	NR					
		PeriPort <sup>d</sup> (1)	Polyurethane	NR					
		Titan Low Profile <sup>e</sup> (1)	Polyurethane	NR					
8	Venography	Vital Port Mini Titanium <sup>b</sup>	Silicone	Yes	23-89	399		1-1325 (252)	98,633
9	Ultrasound, Venography	X Port <sup>e</sup>	Polyurethane	Yes	15-87	750	99.3	1-1032 (430)	327,499
		Vital Port Mini Titanium <sup>b</sup>	Silicone	Yes		13			
10	Palpation	Celsite <sup>f</sup>	Silicone	No	20-91	115	100	NR (NR)	
11	Ultrasound	PAS <sup>a</sup>	Polyurethane	Yes	18-88	152	100	NR (NR)	50,834
12	Palpation	Vital Port Mini Titanium <sup>b</sup>	Silicone	NR	16-91	1704	99.2	0-2996 (381)	643,200
13	Venography	Vital Port Mini Titanium <sup>b</sup>	Silicone	NR	26-81	248	98	8-2132 (364)	90,276
Total						3768			1,265,508

NR = Not reported.

<sup>a</sup>Smith Medical, Dublin, OH.

<sup>b</sup>Cook Medical, Bloomington, IN.

<sup>c</sup>Baxter Deutschland, Unterschleissheim, Germany.

<sup>d</sup>PeriPort<sup>TM</sup> peripheral access system (Strato/ Infusaid, Pfizer Hospital Products Group, Norwood, Mass., USA).

<sup>e</sup>Bard, Karlsruhe, Germany.

<sup>f</sup>B. Braun Medical, Bethlehem, PA.

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