An Inexpensive Support for Prone or Lateral Decubitus Elbow Arthroscopy and Open Elbow Surgery

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Abstract: An inexpensive and radiolucent elbow can be built with a PVC pipe available at any home center or hardware store for less than $25 that allows elbow arthroscopy or open elbow surgery such as open reductions and internal fixation to be performed in the prone, “sloppy” lateral, or decubitus position.

Elbow arthroscopy can be performed in either a supine, lateral decubitus, or prone position. Multiple devices have been used to stabilize or support the elbow. The author has preferred the lateral decubitus, “sloppy lateral,” or prone position and tried multiple devices and techniques over the years with mixed success. There are commercially available elbow support devices,1 but they tend to be expensive ($500 to $1000 or more) and an individual hospital may not have sufficient volume of elbow arthroscopy or open procedures to justify purchase of these devices. Based on inspiration from Flynn et al.,2 the author has designed a very simple support device that can be constructed in less than half an hour in any operating room with materials commonly available in any hardware or home store for less than $25 (Fig 1).

Materials

- 12 feet of 3/4" PVC pipe (JM Eagle, Los Angeles, CA, available at www.homedepot.com)(Fig 2)
- Six PVC 90° angles
- Two PVC T angles
- PVC primer and cement (Fig 3) (Oatey, Cleveland, OH, available at www.homedepot.com).

Construction Steps

Step 1: PVC pipe is very easily cut with a standard cast saw or any fine tooth power saw (Fig 4).
Step 2: Cut seven 10 inch lengths of the PVC pipe for the base and transverse pieces (Fig 2A).
Step 3: Cut 2 lengths of the PVC pipe each that are 4, 6, 8, and 10 inches long (i.e., small, medium, large, and extra large) for the vertical risers to account for different size individuals or positioning (Fig 2B).
Step 4: Dry-assemble the parts to make sure that all of the parts will lie flat and mark alignment before final assembly and cementing (Fig 5).

![Fig 1. Elbow support fabrication “blueprint.”](http://dx.doi.org/10.1016/j.eats.2017.05.022)
Fig 2. Parts necessary to construct the elbow support: (A) seven 10-inch-long horizontal pieces for construction of the support; (B) vertical risers (only short and extra large shown); (C) six 90° right angle couplers; and (D) two T couplers.

Fig 3. Use the primer first and then cement to assemble the elbow support.

Fig 4. A standard cast saw can easily cut the PVC pipe without modifications.

Fig 5. Dry-assemble the parts, make sure that all angles are “square,” and mark alignment (arrows) before cementing the pieces together.

Fig 6. Use the dauber to apply primer before application of cement.

Fig 7. A cemented joint after the pieces have been assembled.
Step 5: Apply primer and cement to the horizontal and transverse pieces (Figs 6 and 7) as per the manufacturer’s instructions and assemble as per the “blueprint” (Fig 1). Do not cement the vertical risers (parts V) (Fig 1). Leaving the vertical risers with a simple friction fit allows the surgeon to adjust the height of the arm support to the individual patient whether prone or decubitus (Figs 8 and 9; Video 1).

Step 6: Adjust the support on a level surface before the cement is hard so that it will lie flat (Figs 8 and 9) on the operating room table (Figs 10 and 11).

Patient Use
The horizontal portion of the support is simply pushed underneath the operating room table mattress.
with the vertical risers on the operative side (Fig 10). The length of the vertical risers necessary for an individual patient will depend on the size as well as whether the patient is in a full prone position or in the lateral decubitus position. The surgeon can adjust the height of the horizontal support and “in or out” (see Video 1) as required based on the size of the patient. The horizontal support directly underneath the arm is padded by towels, as shown in Figure 11, or by pushing the PVC horizontal member through a standard perineal foam pad from a standard fracture table (the perineal pad adds 2-3” to the height of the support and tends to be too thick for the upper arm of small individuals as shown in Fig 11). A tourniquet can easily be applied to the upper arm if required.

**Discussion**

This device provides excellent support and stability to the elbow during arthroscopy and open procedures and also provides excellent proximal and distal access to all areas of the elbow. It is especially useful because of its extremely narrow profile in pediatrics or in smaller individuals. Because the device is radiolucent, it does not disrupt x-rays (Fig 11). A tourniquet can easily be applied and used as necessary. This support is not limited to arthroscopy. The same device can be used for elbow trauma such as open reduction of the distal humerus or olecranon fractures as well as pinning of pediatric supracondylar fractures. Such procedures as open elbow bursectomies or open treatment of tennis elbow can also easily be performed. It has even been used for total elbow arthroplasty. The materials cost less than $25, and compare favorably with commercially available elbow support devices that cost $500 to $1000 or more. There have been absolutely no complications identified with its use to date.

**References**

1. Chen AC-Y, Weng C-J, Chiu C-H, Chang S-S, Cheng C-Y, Chan Y-S. A modified approach for elbow arthroscopy using an adjustable arm holder. *J Orthop Surg Res* 2017;12:20.
2. Flynn JC, Matthews JG, Beloit RL. Pinning of displaced supracondylar fractures of the humerus and shoulder. *J Bone Joint Surg Am* 1974;56:263-272.