CE 1.0 ANCC Contact Hour

Crutch Fitting

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Orthopaedic care may require the use of durable medical equipment (DME). Understanding the basic principles of proper use of DME is necessary to promote healing of the initial injury and to prevent the development of complications. Orthopaedic nurses may encounter patients in a variety of settings using DME incorrectly. Manufacturer's guidelines for placement and provider orders should be confirmed for proper equipment use. The purpose of this short brief is to describe the proper fitting for axillary crutches as well as to describe some of the complications that have been reported with improper use.

Many types of crutches have been used since the middle ages to restore the functional capacity of lower limbs (Hernigou, 2013). Often, crutches are used temporarily for patients to bear weight on the hands and wrists when they are not able to use a lower extremity for ambulation (Faruqui & Jaeblon, 2010; Kunkler, 2013; Perry, Potter, & Ostendorf, 2018). Depending on the gait pattern, crutches can be used for patients from total weight-bearing to completely non-weight-bearing (Kunkler, 2013; Perry et al., 2018; Youdas, Kotajavi, Padgett, & Kaufman, 2005).

There are three types of crutches: axillary, forearm (also called Lofstrand or Canadian crutches), and platform (Faruqui & Jaeblon, 2010; Kunkler, 2013; Perry et al., 2018). Axillary crutches are most commonly used but require arm and shoulder strength as well as the ability to balance. Even though ambulation with axillary crutches requires increased energy expenditure, there is evidence to support they are the best option for efficient ambulation for non-weight-bearing patient compared with other assistive devices (Holder, Haskvitz, & Weltman, 1993). The axillary crutch can also have use outside of ambulation. Bailey, Martin, and Keene described using the axillary crutch to correct knee flexion contracture (Bailey, Martin, and Keene, 2009).

It is important for the orthopaedic nurse to understand the basic principles around use and fitting to prevent complications related to axillary crutch use. Axillary crutches can be made out of wood or aluminum. The height of the crutch and the handgrip can be adjusted for proper fit. The most common error is that the crutches are set at the incorrect height (Faruqui & Jaeblon, 2010; Kunkler, 2013; Perry et al., 2018). Crutches that are too tall can force the shoulders up. Figures 1 and 2 demonstrate crutches that are too tall. Crutches that are too short compel the patient to lean forward and can cause crutch instability, which can be viewed in Video 1 (see supplemental digital content, available at: http://links.lww.com/ONJ/A12). Figures 3 and 4 demonstrate crutches that are too short. Crutches that are too high or too low can contribute to nerve compression or back strain (Chang & DePold Hohler, 2012; Faruqui & Jaeblon, 2010; Kunkler, 2013; Perry et al., 2018). Compression of the radial nerve at the axilla, also known as crutch palsy, can cause numbness and weakness of the hand and the wrist (Chang & DePold Hohler, 2012).

Three areas should be assessed when fitting axillary crutches: the patient's height, the distance between the top of the crutch and the axilla, and the angle of the elbow (Perry et al., 2018). A physical therapist can also fit or assess for proper fit of crutches. There are several ways to determine the proper height of the crutches. One way is to subtract 16 inches (40 cm) from the patient's height (Kunkler, 2013). Kunkler (2013) also describes measuring the distance from the anterior fold of the axilla to the sole of the shoe while the patient is supine and then adding 2 inches (5 cm).

No matter how the height of the crutch is determined, the top of the crutch should be 1.5 to 2 inches (5 cm) from the axilla (American College of Foot and Ankle Surgeons, 2018; Faruqui & Jaeblon, 2010; Kunkler, 2013; Perry et al., 2018). Two to three fingers should be able to be placed between the top of the crutch and the axilla. The handgrips should be adjusted, so the elbows are flexed approximately 15°–30° (Faruqui & Jaeblon, 2010; Kunkler, 2013; Potter et al., 2018). It is also important to inspect crutches for structural integrity, including the rubber tips, daily to ensure safe use (Kunkler, 2013; Potter et al., 2018). Figures 5 and 6 demonstrate the proper height for crutches with elbow flexion between 15° and 30° and approximately 1.5 to 2 inches between the top of the crutch and the axilla. Video 2 (see supplemental digital content, available at: http://links.lww.com/ONJ/A13) demonstrates non-weight-bearing and Video 3 (see supplemental digital

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Medical equipment acknowledgement to Scott Haertel. Photo credit to Alexander Sroka. Video acknowledgement to Laura Daniels. Manuscript critique acknowledgement to Krista Sheppard.

The author has disclosed no conflicts of interest.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's website (www.orthopaedicnursing.com).

DOI: 10.1097/NOR.0000000000000469

FIGURE 1. Crutches are too tall with no flexion of elbows. (Photograph: Alexander Sroka.)

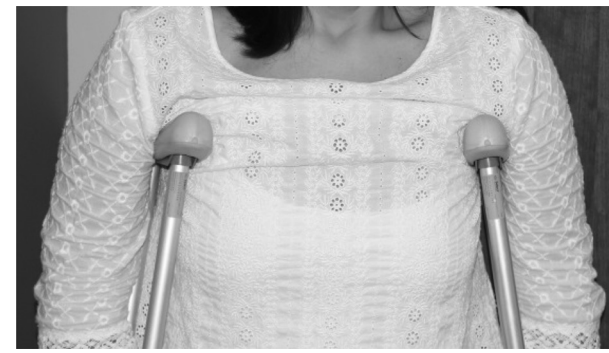

FIGURE 2. Crutches are too tall with no space between the crutch pad and the axilla. (Photograph: Alexander Sroka.)

FIGURE 3. Crutches are too short and the patient is leaning forward on the crutch pads. (Photograph: Alexander Sroka.)

FIGURE 4. Crutches are too short with too much space between the crutch pad and the axilla. (Photograph: Alexander Sroka.)

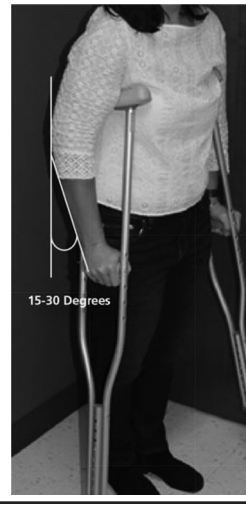

FIGURE 5. Crutches are at the correct height with elbow flexed at 15°–30°. (Photograph: Alexander Sroka.)

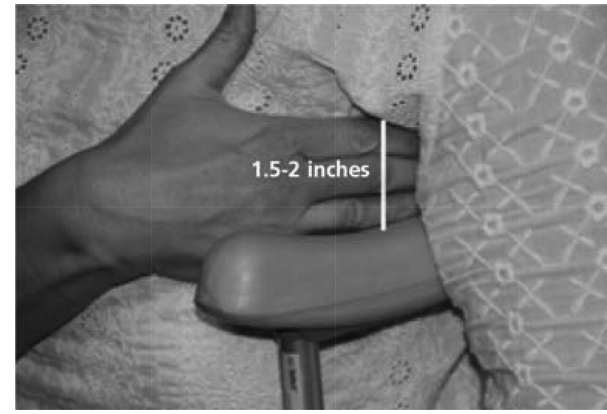

FIGURE 6. Crutch is at the correct height, the crutch pad is 1.5–2 inches (two to three fingers) below the axilla. (Photograph: Alexander Sroka.)

content, available at: http://links.lww.com/ONJ/A14) demonstrates full and partial weight-bearing with properly fitting crutches.

It is imperative that orthopaedic nurses have the knowledge and skills to assist patients with proper use and fit of axillary crutches to avoid complications. Have these photos inspired you to share an observation you have made in your practice or out in the community? We encourage you to send in your ideas, photos, and a referenced write-up.

References

American College of Foot and Ankle Surgeons. (2018). *Instruction for using crutches*. Retrieved from https://www.acfas.org/footankleinfo/crutches.htm

Bailey, C. A., Martin, T., & Keene, G. C. (2009). The use of an axillary crutch as a knee flexion contracture correction device. *Annals of the Royal College of Surgeons of England*, *91*(2), 170.

Chang, I. T., & DePold Hohler, A. (2012). Bilateral radial nerve compression (crutch palsy): A case report. *Journal of Neurology & Neurophysiology*, *3*, 130.

Faruqui, S. R., & Jaeblon, T. (2010). Ambulatory assistive devices in orthopaedics: Uses and modifications. *Journal of the American Academy of Orthopaedic Surgeons*, *18*(1), 41–50.

Hernigou, P. (2014). Crutch art painting in the middle age as orthopaedic heritage (part I: the lepers, the poliomyelitis, the cripples). *International Orthopaedics*, *38*, 1329–1335.

Holder, C. G., Haskvitz, E. M., & Weltman, A. (1993). The effects of assistive devices on the oxygen cost, cardiovascular stress, and perception of nonweight-bearing ambulation. *Journal of Orthopaedic & Sports Physical Therapy*, *18*(4), 537–542.

Kunkler, C. (2013). *Therapeutic modalities*. In L. Schoenly, (Ed.), *Core Curriculum for orthopaedic nursing* (7th ed., pp. 233–262). Chicago, IL: National Association of Orthopaedic Nurses.

Perry, A. G., Potter, P. A., & Ostendorf, W. R. (2018). *Clinical nursing skills and techniques* (9th ed.). St. Louis, MO: Mosby Elsevier.

Youdas, J. W., Kotajarvi, B. J., Padgett, D. J., & Kaufman, K. R. (2005). Partial weight-bearing gait using conventional assistive devices. *Archives of Physical Medicine and Rehabilitation*, *86*(3), 394–398.