Vaccine administration: Preventing serious shoulder injuries

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Erroneous administration of intramuscular vaccines, particularly above the deltoid muscle, can result in serious shoulder injuries and diminished vaccine efficacy. With few studies published addressing injection technique before 2002, inconsistencies arose regarding optimal vaccine administration, thus causing variations in current practice. We will examine cases of serious shoulder injuries as a result of incorrect technique and provide a step-by-step guide to the proper administration of intramuscular injections.

In 2006, Bodor and Montalvo reported two cases of vaccine-related shoulder dysfunction. One patient received the 23-valent pneumococcal vaccine and the other an influenza vaccine. Both patients reported receiving injections high into the deltoid muscle, within 1 to 2 cm of the acromion. Both patients noticed severe shoulder pain and loss of range of motion within 2 days and increasing pain during a period of 2 to 5 months. One patient was diagnosed with subacromial bursitis that later progressed to adhesive capsulitis or frozen shoulder; the other was diagnosed with bicipital tendonitis, subacromial bursitis, and a mild C6 sensory radiculopathy. The authors recommended that guidelines specify avoiding vaccine injections in the upper third of the deltoid muscle. They recommended that health professionals consider vaccine-related shoulder dysfunction in patients presenting with shoulder pain and weakness following a vaccine injection.

Atanasoff et al. reported a series of 13 cases submitted to the Vaccine Injury Compensation Program between 2006 and 2010, in which patients experienced shoulder injury related to vaccine administration. Of the cases, 62% received influenza vaccine and the remainder received tetanus–diphtheria toxoids, Td–acellular pertussis, or human papillomavirus vaccine. The proposed mechanism of injury was that vaccine, an antigenic substance, injected into synovial tissue resulted in an immune-mediated inflammatory response. Of patients, 46% stated that the vaccine was injected “too high” into the deltoid muscle. Magnetic resonance images revealed fluid collections in the deep deltoid or overlying the rotator cuff tendons, bursitis, fluid buildup within the bursa, or rotator cuff tears. About one-third of patients (31%) required surgery, with one-half of those requiring a second surgical intervention. Many patients (69%) had residual symptoms, and 31% experienced full recovery. The authors proposed seating both the injector and the patient to reduce the probability of injecting high into the deltoid muscle.

Injecting into the thickest, most central portion of the deltoid muscle is important in preventing these severe shoulder injuries. The injection must be administered into the muscle at a 90-degree angle to the skin. Health professionals need to remain knowledgeable about the anatomy of the shoulder (Figure 1) to avoid injecting too high. Further, reviewing current recommendations for intramuscular injections helps ensure that proper technique is used.

Recommendations for intramuscular vaccine administration are as follows:

- Sitting both the injector and the patient to reduce the probability of injecting high into the deltoid muscle.
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Wash and dry hands thoroughly with bactericidal soap and water or use bactericidal hand sanitizer to prevent contamination of syringe or vaccine. Gloves are optional.

- Verify the correct vaccine. Examine the vaccine solution for cloudiness or sedimentation and check the expiration date. Discard the solution and never administer to the patient if any of these changes are found or the vaccine is expired.

- Using aseptic technique, load dose into the syringe. Pick an appropriate needle size. Use a 1-in needle for most adult patients. For male patients weighing more than 118 kg or female patients more than 90 kg, use a 1.5-in needle. For adults weighing less than 60 kg, use a 0.625-in needle. (General rule: Women have more subcutaneous fat than men.)

- Organize vaccine-filled syringe, alcohol swab, cotton ball, bandage, and biohazard sharps container near the patient.

- Locate the thickest and central portion of the deltoid muscle (Figure 2).

- Wipe site with alcohol swab to clean oils and dirt from injection site. Allow skin to dry.

- Control the limb with the non-dominant hand.

- With the dominant hand, hold the syringe like a dart with your index finger and thumb. Using a dart-like motion, insert the needle at a 90° angle with a quick thrust into the patient’s skin.

- Aspiration is not necessary. Push the plunger in quickly and smoothly.

- Remove the needle in a smooth motion at the same angle of insertion with the dominant hand. Activate the safety device. Discard the used needle and syringe into a biohazard sharps container. Do not take your eyes off the used needle until it is safely inside the sharps container. Never recap the needle after it has been exposed to the patient.

- Apply slight pressure to the injection site with a cotton ball to discourage bleeding. Apply adhesive bandage.

- Remove gloves (if used), then wash hands.

- Document each immunization. Give patient appropriate education, documentation, and reminders about future doses.

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References

Figure 2. Injection location

The red circle marks the target area of intramuscular injection.