

# Subdeltoid/subacromial bursitis associated with influenza vaccination

Ian F Cook<sup>1,2</sup>

<sup>1</sup>Newcastle University; Newcastle, NSW Australia; <sup>2</sup>University of NSW; Sydney, NSW Australia

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A 76-year-old male presented with subacromial/subdeltoid bursitis following influenza vaccine administration into the left deltoid muscle. This shoulder injury related to vaccine administration (SIRVA) could have been prevented by the use of a safe, evidence based protocol for the intramuscular injection of the deltoid muscle.

## Introduction

Injection site reactions (ISRs) such as pain, erythema, and induration are commonly recognized transient sequelae following vaccine administration into the deltoid muscle in adults.<sup>1,2</sup> In 2010, the Vaccine Injury Compensation Program (VICP), US recognized<sup>3</sup> persistent shoulder injury related to vaccine administration (SIRVA) as a complication of deltoid muscle vaccination. These injuries include subacromial/subdeltoid bursitis,<sup>4</sup> palsies of the anterior branch of the axillary<sup>5</sup> and radial<sup>6</sup> nerves and atraumatic osteonecrosis of the humeral head.<sup>7</sup> In this case presentation subacromial/subdeltoid bursitis is reported following influenza vaccine administration into the deltoid muscle.

## Patient Presentation

A 76-y-old non-diabetic man with a history of ischemic heart disease presented with a 3-day history of severe pain and loss of movement in his left upper arm and shoulder following influenza vaccination administered into the upper arm. He reported that he had received an annual influenza vaccination for more than 20 y and that he had no arm or shoulder injuries, pain or limited movement of his shoulder prior to vaccination. He recalled that the vaccination was administered by a practice nurse and that its administration was associated with severe, sharp pain which he rated as 8/10 in intensity. He also asserted that he thought the injection had been given “too high” in the upper arm and identified an area about 3cm below the mid-acromion where he thought the vaccine had been administered.

Clinical examination of his shoulder revealed that he had an impingement syndrome of his left shoulder; active and passive abduction—elevation, left shoulder 80°, right shoulder 180°; passive external rotation, left shoulder 70°—very painful, right shoulder 70°—no pain; passive internal rotation, left shoulder 80°—very painful, right shoulder 90°—no pain. He had positive

Yocum and Hawkin tests of the left shoulder. He had no injection site reaction on his left deltoid muscle, which appeared mildly atrophic.

Urgent left shoulder ultrasound showed that the subacromial bursa was thickened and contained debris “suggesting bursitis.” The subdeltoid bursa was found to extend 3.2cm distally below the mid-acromion and skin to bursa distance was measured at 1.1cm. Ultrasound guided steroid injection of the left subacromial bursa gave good relief of pain with the return of normal shoulder movement at 1 month.

## Discussion

Persisting injury following administration of vaccines into the deltoid muscle is due to a combination of lack of awareness of structures which can be injured by injection into this muscle and also the multiplicity of methods for injection site selection in the muscle.

In the study by McGarvey and Hooper<sup>8</sup> involving 50 general practitioners and 50 practice nurses, half of those surveyed could not name any structure at risk from deltoid muscle injection. Four different general methods have been recommended<sup>9</sup> for site selection for intramuscular injection of the deltoid muscle. Techniques have been:

1. Based on location of the acromion with injection given variable distances below this landmark measured as centimeters or finger breadths/widths.
2. Based on location of the acromion and a line drawn laterally across the deltoid muscle from the apex of the anterior axilla. Injection is given into the midpoint of a triangle, apex on this latter line and base either on 2 or 3 finger breadths below the acromion.
3. Based on administration of the injection midway between the acromion and the deltoid tuberosity.

Correspondence to: Ian F Cook; Email: drifcook@bigpond.com  
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4. Based on administration of the injection into the middle third of the deltoid muscle.

McGarvey and Hooper also noted<sup>8</sup> that in their surveyed population there was uncertainty about site of injection in the deltoid muscle and called for the establishment and training in the use of safe, reliable and effective protocols for the intramuscular injection of the deltoid muscle.

In response, Cook<sup>9</sup> conducted an anthropometric study in 536 patients, (283 males 253 females) aged  $\geq 65$  y, who regularly received intramuscular injection of vaccines into their deltoid muscle. The position of structures potentially injured by injection were mapped in relation to surface landmarks on the upper arm.

It was observed that all the currently recommended injection site selection methods had potential to result in injury to the subacromial/subdeltoid bursa and/or the anterior branch of the axillary nerve with the arm in the neutral position. However,

abduction of the shoulder to 60° by placing the hand on the ipsilateral hip resulted in injection at the midpoint between the acromion and the deltoid tuberosity becoming a safe practice. Injection above this mid point had the potential to cause injury to the anterior branch of the axillary nerve or the subacromial/subdeltoid bursa.

This occurred in the case presented as the distal extent of the subdeltoid bursa was about 2 finger breadths (3.2cm) below the acromion. Further caution about injection close to the acromion comes from the study<sup>10</sup> by Petousis-Harris et al. with human papilloma virus vaccine in which it was noted that “on the occasions the vaccinator inadvertently injected particularly close to the acromion the pain scored tended to be higher.”

#### Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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