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# Transarterial Embolization for Shoulder Injury Related to Vaccine COVID-19 Administration

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**Abbreviations**

| | |
|---|---|
| AC | Adhesive capsulitis |
| FS | Frozen shoulder |
| MR | Magnetic resonance |
| SIRVA | Shoulder injury related to vaccine administration |
| SSS | Secondary shoulder stiffness |
| SS | Shoulder stiffness |
| TAE | Transcatheter arterial embolization |
| VAS | Visual analogical scale |

## Introduction

Shoulder injury related to vaccine administration (SIRVA) is a preventable and well-described injury occurring after the administration of a vaccine into anatomic structures adjacent to the deltoid muscle. It causes shoulder pain and limitation of the range of motion due to a mechanical and chemical trauma that triggers an inflammatory response to the vaccine. It is mostly known after influenza vaccination and has also been described after COVID-19 vaccination in this pandemic [1]. The most common diagnoses are adhesive capsulitis (AC) and bursitis, and both manifest with pain and limitation of the shoulder mobility [1, 2]. We present a case of SIRVA due to a COVID-19 vaccination and treated by transarterial embolization (TAE) and physiotherapeutic treatment.

Fifty-year-old woman presents painful left shoulder stiffness 24 h after administration of the first dose of COVID-19 vaccine. She refers to a pain of 9 on the visual analogical scale (VAS) with limitation of the mobility especially on internal rotation. Subsequently she develops progressive clinical and functional worsening. After the second dose, one month later, a venous cord and axillary lymphadenopathy appeared, accompanied by increased pain and rapid evolution to loss of mobility. Rehabilitation physicians advise against physiotherapeutic treatment for severe pain, so she is managed with oral analgesia without response.

It was decided to perform a magnetic resonance (MR) study where edematous changes and severe thickening of the synovium and the capsule at the axillary recess, moderate obliteration of the fat in the rotator interval and diffuse enhancement after intravenous contrast administration were identified (Fig. 1).

After these findings, it was decided to perform an angiography of the left shoulder, where areas of pathological blush enhancement were identified in the axillary recess and in the rotator interval—superior capsule (Fig. 2A). An injection of 9 ml (ml) of iodinated contrast media was performed at 3 ml per second through a 6 French guide catheter. Selective microcatheterization of the anterior humeral circumflex, coracoid and acromial arteries, respectively, was performed with a 1.7 F

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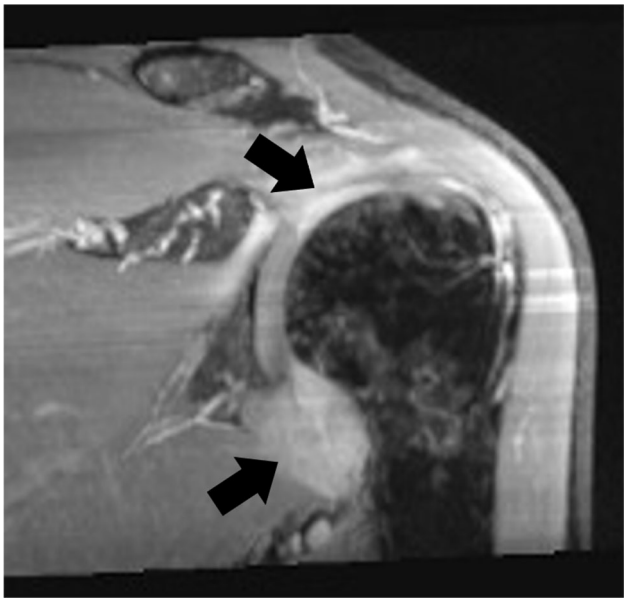

**Fig. 1** Severe thickening of the synovium and the capsule with a diffuse enhancement after intravenous contrast administration on T1 fat sat gradient echo with MIP reconstruction is visualized (arrows)

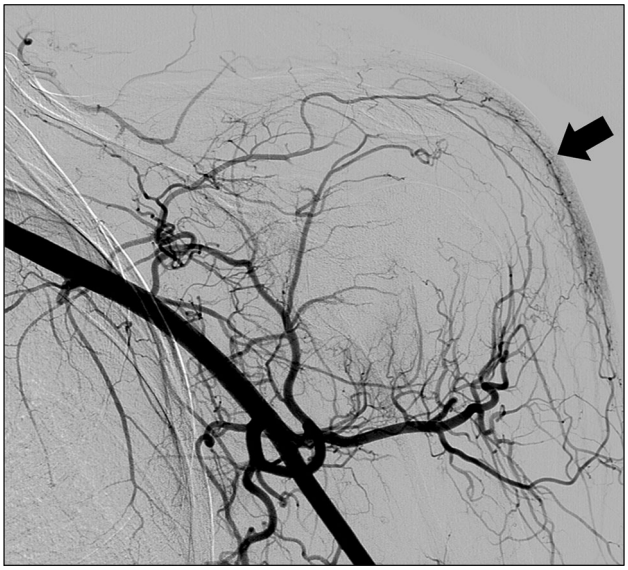

**Fig. 3** Result after embolization where a normal angiographic pattern can be seen except post-vaccination subcutaneous area where blush enhancement persists (arrow)

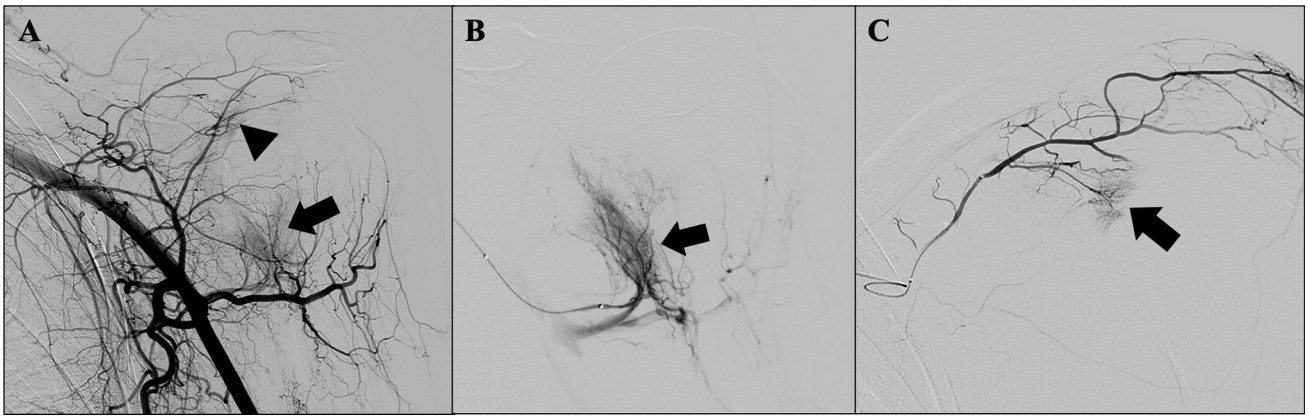


**Fig. 2** **A** Digital subtraction angiography performed from left subclavian artery where there is a capsular enhancement at the axillary recess (arrow) and the rotator interval—superior capsule (arrowhead). Superselective arteriogram by manual injection from the anterior humeral circumflex artery (**B**) and from the acromial artery (**C**) where capsular enhancement (arrow) can be observed

microcatheter (Fig. 2B, C), and they were embolized distally with 2.4 ml of a mixture of imipenem/cilastatin sodium and iodinated contrast media until there was a complete stasis with reflux back along the microcatheter tip. In control angiography, the pathological areas have disappeared except post-vaccination subcutaneous area where blush enhancement persists (Fig. 3). In addition, due to flow redistribution after embolization it was not visualized in the first injection.

The patient reported an immediate decrease in pain, being 3 on VAS one week after TAE. She started rehabilitation with great improvement in mobility, and three months after embolization, shoulder mobility has completely recovered. Clinical results have remained stable during one year of follow-up.

Many authors have described the importance of hypervascularization of the capsule in the pathophysiology of AC. It is known that angiogenesis is a necessary factor to generate an inflammatory state and Okuno et al. reported the existence of pathological angiographic hypervascularization in all patients in their series [3, 4]. The objective of TAE is to decrease the abnormal vascularization responsible for the inflammatory state that also occurs in SIRVA [1]. Also, TAE has emerged as a therapeutic option in patients with AC refractory to conventional treatment [3–5].

SIRVA is a well-established condition in the medical literature; and there are examples after administration of the COVID-19 vaccine. There are references of arterial embolization in secondary stiff shoulder but not about SIRVA treated by TAE [1, 5].

This case corresponds to a SIRVA of synovitis–capsulitis due to an inflammatory response of the capsule to the vaccine. Transarterial embolization and physiotherapeutic treatment were associated with reduced pain and improved mobility.

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**Declarations**

**Conflict of interest** The authors declare that they have no conflict of interest.

**Consent for Publication** Consent for publication was obtained for every individual person's data included in the study.

**Ethical Approval** The study performed was in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. This study was approved by the Institutional Review Board (IRB). Our hospital clinical research ethics committee approved this study.

**Informed Consent** Informed consent was obtained from the patient included in the study.

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