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## Introduction

Sublingual buprenorphine/naloxone is a common treatment for opioid dependence. The buprenorphine component is a partial agonist of the mu opioid receptor and reduces the symptoms of opiate withdrawal. Naloxone produces an antagonistic effect when administered parenterally, reducing the potential for abuse. Despite its design, the medication is still sometimes abused. A common misuse of the medication is to dissolve the gelatin strip and inject the medication intravenously. Inadvertent intra-arterial injection of buprenorphine/naloxone can produce acute ischemic insult to the hand due to gelatin embolism.

## Objectives

Our purpose was to review a series of patients with hand ischemia after suboxone injection in order to describe the clinical entity, review the outcomes, and propose a rational treatment algorithm.

## Methods

A review was performed of all patients evaluated by the hand surgery team with ischemia of part or all of the hand following buprenorphine/naloxone injection between 2011 and 2015. Clinical records were reviewed. Demographic data, co-morbidities, smoking status, medical and surgical treatments, complications, and amount of tissue loss were recorded. Those patients presenting within 48 hours of the injection were treated with intravenous heparin and warming for 5 days, after which they were maintained on oral aspirin and clopidogrel for 30 days. Those presenting after 48 hours were treated with aspirin and clopidogrel only.

## Results

A total of 10 patients presented during the review period. Average follow-up time was 13 weeks. Eight patients had ischemia of the radial hand or digits, one had ischemia of the ulnar hand/digits, and one had both. Three patients presented within 48 hours of the injection and were treated with intravenous heparin. Five patients were treated with oral agents. Two patients presented over 30 days after injection with dry gangrene and did not receive anticoagulation. All patients experienced tissue loss, and there was no difference seen in outcome regardless of type of anticoagulation administered. Four patients required surgical intervention for debridement and reconstruction.



Figure 1: 31 y.o. female with pain, swelling, and discoloration of the ulnar hand 3 days after injection into the ulnar artery.



Figure 2: Angiogram of the left hand in a 43 y.o. female 4 days after injection into the radial artery. The patient developed dry gangrene of the thumb distal to the IP joint requiring amputation.



Figure 3: 45 y.o. female who developed dry gangrene of the thumb after injection into the radial artery.

Table 1: Patients presenting with hand ischemia after suboxone injection

Patient	Location	Presentation	Treatment	Level of Tissue Loss
1	RF	3 days	ASA/Heparin	Middle Phalanx
2	Thumb	7 months	None	Distal Phalanx
3	Thumb/LF	1 month	None	PIP
4	Thumb	4 days	Lovenox/Warfarin	Distal Phalanx
5	IF/LF	3 days	ASA	Distal Phalanx
6	Thumb	21 days	ASA	Distal Phalanx
7	Thumb	10 days	Lovenox/Warfarin	Proximal Phalanx
8	IF/MF/RF	1 day	Heparin/ASA/Plavix	Distal Phalanx
9	Thumb/IF	2 days	Heparin/ASA	?
10	Thumb/IF	4 days	ASA/Plavix	?

## Conclusions

With the increasing use of sublingual buprenorphine/naloxone in opioid dependency, ischemic hand injuries from inadvertent intra-arterial injection will be seen with greater frequency. It is important for prescribers of this medication to inform their patients of the potential risks of attempted intravenous abuse. Whereas outcomes did not vary with treatment modality in this series, further study is needed to determine the most effective treatment of these injuries.