

# Assessing and Managing Arterial Ischemic Pain

PRESENTERS:

PAMELA HOUGHTON  
PT PhD

CHARLOTTE KOSO  
RN BN CHPCN(C)

VALERIE SCHULZ  
MD FRCPC

## Introduction



During this session, participants were given an overview of ischemic arterial pain, current research for nonpharmacologic treatment of ischemic and wound-related pain, as well as a method of assessing total pain in patients living in the community.

## Pain – An overview

Pain is defined as an unpleasant sensory and emotional experience associated with actual and potential tissue damage. Acute pain is functional and purposeful. It is the body's signal to protect and guard damaged tissues. However, because there are multiple pain pathways (central, spinal and peripheral) and pain modulators, the pain signalling can get out of control and become chronic.

Pain can be subcategorized as nociceptive, which results from excitation of nociceptors (free nerve endings) via damage (mechanical or ischemic) that is perceived as somatic or visceral pain. Pain is perceived by nociceptors in the periphery. The free nerve endings located between the epidermis and the dermis transmit signals via the spinal cord, which are then transmitted to the higher brain centres and the cortex. Nociceptive pain, often related to tissue damage and inflammation, is typically described as aching or throbbing.

Another subcategory, neuropathic pain, is due to nerve damage, and is often associated with altered sensation and autonomic changes. Common examples of neuropathic pain include diabetic neuropathy (26%), herpes zoster and phantom limb pain. This type of pain is often described as shooting, stabbing, burning or electric shock.

Other categories of pain include: allodynia, which is due to a stimulus that does not normally provoke pain; and hyperalgesia, an abnormally heightened sensitivity to pain, which can occur when pain pathways become sensitized.

## Ischemic arterial pain

Ischemic arterial pain is nociceptive pain associated with reduced blood flow tissue oxygenation. As it often accompanies severe underlying cardiovascular

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pathology, it commonly occurs in individuals with venous or renal disease, or in those undergoing vascular surgery. Peripheral arterial disease causing an ischemic wound can be reflective of disease in the main organs in the body – the brain, heart and kidneys. The pain can be severe and unrelenting, and is often worse at night and/or when a limb is elevated. It occurs at rest and during exercise (claudication).

## Critical limb ischemia

Critical limb ischemia is characterized by pain at rest, non-healing ulcers of the foot and gangrene. The diagnosis is made on the basis of a history and physical examination, which includes the presence or absence of pulses (Doppler signals), and evaluation of the following: vital organ function (kidney, heart, brain and eyes) in order to understand if arterial disease is widespread; overall change in quality of life; and causes of pain, including wound pain.

Medical management involves addressing risks to reduce the risk of myocardial infarction (e.g. hyperlipidemia, smoking, hypertension, obesity, diabetes and hypercoagulation of microcirculation). Patients with diabetes are 20% to 30% more likely to develop peripheral arterial disease and critical limb ischemia. Their risk increases with duration of diabetes, as their microcirculation is progressively impaired. Optimal diabetes treatment is essential.

Treatment of hyperlipidemia has been shown to reduce cardiovascular events by 25% over a 5-year period, and to increase pain-free walking and decrease claudication by 65% at 12 months.

Smoking increases the risk of peripheral arterial disease by 2.5% to 9.8%. Smoking cessation reduces the risk of critical limb ischemia, amputation, myocardial infarction and stroke, and may improve walking and wound healing.

### Pamela Houghton

is a professor with the School of Physical Therapy at Western University in London, Ontario.

### Charlotte Koso

is Senior Manager, Program Planning and Service Integration, with Red Cross Care Partners in Moffat, Ontario.

### Valerie Schulz

is an associate professor in the Department of Anesthesia and Perioperative Medicine at the Schulich School of Medicine & Dentistry at Western University in London, Ontario.

TABLE 1

### Nonpharmacologic pain therapies

Behavioural/cognitive	<ul style="list-style-type: none"> <li>• Relaxation</li> <li>• Distraction (e.g. music)</li> <li>• Visual imagery</li> </ul>
Patient education	<ul style="list-style-type: none"> <li>• Positioning</li> <li>• Exercise (e.g. for claudication)</li> </ul>
Biophysical agents	<ul style="list-style-type: none"> <li>• Electrotherapy               <ul style="list-style-type: none"> <li>– <i>Conductive</i>: transcutaneous electrical nerve stimulation; high-voltage pulsed current; neuromuscular electrical stimulation; high-frequency electrical muscle stimulation; frequency rhythmic electrical modulation system</li> <li>– <i>Inductive</i>: pulsed electromagnetic field; pulsed radiofrequency; pulsed short-wave diathermy</li> </ul> </li> <li>• Monochromatic light therapy</li> <li>• Hyperbaric oxygen</li> </ul>

Hypertension increases atherosclerosis and peripheral arterial disease. Decreasing blood pressure levels reduces the risk of limb amputation, and of death from myocardial infarction, stroke and microvascular thrombosis.

For symptomatic patients with low ankle brachial index (ABI), medical management may include ASA therapy, weight loss and exercise as tolerated. Pain is the most common symptom, with pain at rest and pain with dressing changes.

Chronic pain management is necessary, as ischemic nerve injury may take time to resolve. In addition, ischemic wounds are at risk of infection and subsequent infection-related pain. Infection can lead to microvascular thrombosis and further worsen the peri-wound ischemia. These wounds need to be cleansed topically, necrotic tissue must be removed, and antibiotics should be used if necessary. If possible, the limb should be revascularized.

It is essential to identify if a patient is at risk of dying. This is easier to determine in patients with malignant vs. non-malignant conditions. People who are dying often have severe arterial ischemic pain. The goals of care must be determined through shared decision-making and consideration of the patient's disease state (i.e. is it reversible and treatable?), the patient's and family's understanding of the illness, their own values and wishes, and the overarching goals of life extension and comfort. Options include offering palliation in the care plan, deciding the aim of wound care in the context of threatened arterial supply, and discussing code status with the physician.

#### Capturing the total pain experience

Assessing pain in a systematic manner is practised in oncology, palliative care, acute situations such as post-operative care and injury, and acute wounds. However,

TABLE 2

### Pharmacologic pain therapies

- Nonsteroidal anti-inflammatory drugs
- Opioids
  - Systemic: oral, intravenous, inhaled
  - Local: injection, topical (cream, powder), dressings, patches
- Nerve block: sodium, N-methyl-D-aspartate
- Anticonvulsants
- Antidepressants

an environmental assessment identified that many clients in the community had unmanaged wound pain and chronic wound pain such as ischemic arterial pain.

#### Innovative nonpharmacologic treatments

The presenters reviewed the current literature on nonpharmacologic treatments for ischemic arterial pain. These treatment modalities are listed in Table 1, while pharmacological treatments are shown in Table 2. Many modalities involve electrotherapy, which can promote analgesia by increasing tissue perfusion, angiogenesis, nitric oxide release and release of vascular endothelial growth factor.

#### Conclusions

The session concluded with reminders about the importance of setting goals for care (which may not always be to heal the condition), the need for comprehensive investigations of the types and causes of wound pain, and the evidence supporting nonpharmacologic approaches to wound care. 🙌

*For suggested reading, please see page 34*