Neuroprotective Developmental Care Clinical Guidelines

LACTATION-RELATED NIPPLE PAIN AND WOUNDS

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Nipple pain and damage is a common presentation in lactating women, and often leads to early cessation of breastfeeding. Nipple pain predisposes to postnatal depression, stromal breast inflammation (mastitis), low supply, and occupational fatigue related to mechanical milk removal.

Interventions for nipple pain and damage remain a research frontier. Overmedicalization and overtreatment is common, and frequently distracts from clinical intervention for nipple and breast tissue drag with its associated mechanical microtrauma. These guidelines are built from the NDC mechanobiological model, which proposes that lactation-related nipple pain results from inflammation caused by repetitive application of excessive mechanical stretching and deformational forces to nipple epidermis, dermis and stroma during milk removal. When the epidermis and dermis fracture as a result of excess mechanical pressure, wounds result.

NDC mechanobiological model: aetiology of nipple-areolar complex pain and wounds

1. Nipple and breast tissue drag (that is, external forces conflict with intra-oral vacuum forces) result in inflammation and nociception because of
    - Concentration of high mechanical pressure on small area of the nipple-areolar complex (NAC), or
    - Deformational forces applied to nipple stroma
2. Epithelial overhydration and moisture-associated skin damage
    - Presents as erythema, maceration or skin erosion
    - Increases vulnerability to mechanical pressure and epidermal fracture
    - Delays wound healing
    - There are benefits to the hyperosmolar environment of dessication, scab formation and granulomatous healing, due to the NAC's unique exposure to repetitive vacuum and other mechanical forces.

Controversies

Candidiasis, vasospasm, and tongue tie are overtreated as causes of nipple pain and damage (see explanations in table below 'What does not help'). Moist wound healing is widely recommended if a breastfeeding woman has nipple pain or damage, but this approach can delay healing of lactation-related nipple inflammation and wounds.

Fit and hold interventions remain experience based, as fit and hold remains an omitted variable bias in most clinical breastfeeding research. Laid back breastfeeding is an important advance (incorporated into steps 2 and 3 of the gestalt method), and has been shown to modestly decrease the incidence of nipple pain if introduced immediately after the birth, but has not been beneficial as an intervention for the healing of nipple pain and damage.

Persistent nipple pain is not 'allodynia', central sensitisation or nociplastic pain according to International Association for the Study of Pain criteria. Avoid attributing persistent nipple pain to psychological vulnerability or mood problems. Nipple pain results from repetitive mechanical micro-trauma and inflammation of epithelium and stroma. When trauma ceases, inflammation resolves, nipple heals, pain ceases. This differs from the ABM Clinical Protocol #36.

ASSESSMENT

History

Includes

- Breastfeeding pattern, use of mechanical pump
- Pain pattern and timing
    - Note that a woman's description of her pain does not help with the diagnosis
- Onset of nipple pain, damage or trauma
- Use of nipple shields (type and sizing); also use of breast shells, silverettes, wearable pump
- Nipple blanching or colour change triggered by exposure to cold (vasospasm)
    - NB. Usually related to repetitive microtrauma
- Pruritic or persistent rash
- Past history of eczema or dermatitis
- Treatments trialed – including topical ointments, hydrogel and polymem
- History of herpes in the lactating woman or any family members or contacts
- Impact on sleep and mood
- Avoid introducing inquiry into childhood or sexual trauma in breastfeeding consultations

Examination

- Nipple and areola appearance
- Signs of nipple damage: blisters, bruises, erythema, oedema, cracks, fissures, ulcers, exudate, scabbing
    - Erythema and swelling may occur in the absence of visible wounds.
- White scale (hyperkeratotic response)
- Presence of vesicles (consider viral infection)
- Presence of white spots
- Peri-wound cellulitis
- Breast symptoms, lumps, warmth or inflammation
- Infant oromotor examination – presence of classic tongue tie?

- Breastfeeding assessment with rating of pain (0-10) during the breastfeed
    - Is there breast tissue drag or positional instability?
    - Onset of pain and patient's response to this during the breastfeed

Investigations

- Viral swab for HSV/VZV PCR - if vesicles present or swab indicated by history
- Swab for microscopy and culture – only if commencing oral antibiotics
    - It is likely that S.aureus will be found, however it may alert the clinician to the presence of MRSA and a need to change antibiotics if not responding

What not to miss

1. **Viral infection** (Herpes Simplex Virus, Varicella Zoster Virus)
    - Requires antiviral treatment (aciclovir or valaciclovir)
    - Avoid feeding from the affected breast, discard milk pumped from that breast
    - Cover the affected breast to avoid infant contact
    - Good hand washing and pump cleansing hygiene
2. **Cellulitis or impetiginous change**
    - May require antibiotic treatment
3. **Paget's Disease of the nipple**
    - Persistent rash not responding to steroid treatment
    - Requires punch biopsy and breast surgeon referral if confirmed

MANAGEMENT OF NIPPLE PAIN AND DAMAGE

1. **Aim to eliminate breast tissue drag during breastfeeding and pumping**
    - During breastfeeding – apply Gestalt intervention for fit and hold
    - During mechanical milk removal – ensure correct flange sizing and settings
        - Ensure nipple moves freely without rubbing on the inside of the flange tunnel, and that minimal areola is drawn up into the tunnel;
        - Invite a woman to experiment between different sized flanges;
        - Invite her to experiment with different flange options;
        - Hand express one breast while pumping the other, and change over the next time;
        - Pump on lowest effective vacuum setting and for short periods of time e.g. 10 minutes, because frequent short pumping is more effective in milk removal and milk generation than less often, longer periods;
        - Don't use hands free pumping
        - Apply olive oil as lubricant
    - Consider:
        - Scissor frenotomy for anterior tongue tie if impacting breastfeeding
        - Use of nipple shields, ensure sizing is not too small (see below)

- Temporary nipple rest if severe pain (see below)

2. **Prevent or heal moisture-associated skin damage**
    - Educate patient about risks of overhydration and moisture-associated skin damage
    - Educate re risks of silverettes, breast shells and wearable pumps
    - Encourage air exposure as much as possible
        - explain the benefits of exposing the nipples to the air as much as possible or practical (consider sleeping without a bra, on a soft towel)
    - Avoid most topical balms or ointments which cause overhydration

    If a wound is present, prevent the wound sticking to breast pad
    - Cautiously apply lanolin or a hydrogel or polymembranous dressing
    - Remove breast pads carefully or soak off if adherent
    - Educate that exudate and eschar (scab) are a normal part of healing
        - Exudate can be washed away twice daily (either in the shower, or a careful wash with cotton wool soaked in water)
        - Eschar is part of the healing process and can be protective
            - If small – no need to remove a scab, it will be debrided through the process of milk removal
            - If large – can soak the nipple in milk and remove the scab prior to breastfeeding. Complete nipple rest may be more appropriate in this circumstances to allow healing.

3. **Prevent further damage from clothing**
    - Breast pads need to be as soft and non-irritating as possible
    - Prevent the wound adhering
    - Consider compressive or deformational forces inside the bra

4. **Consider use of nipple shields**
    - These can be a useful adjunct intervention for nipple pain where there is:
        1. Severe pain and/or damage;
        2. Conditioned sympathetic hyperarousal at the breast, and pain;
        3. Very low-height nipple contributing to difficulties bringing baby on despite ongoing intervention to address fit and hold
    - They should not be used as a replacement for addressing positional instability or conditioned dialling up at the breast

5. **Partial or complete nipple rest**
    - Take baby off if sleepy and not actively transferring milk
    - Direct breastfeed less often, with complementary use of the bottle
    - Check use of pump for mechanical trauma
    - If pain is severe and constant, and pumping perpetuates the nipple wound, breastfeeding and lactation are most likely to be preserved in the medium to long term if the woman completely rests her nipples for a up to a week, depending on the clinical presentation, despite the significant short-term

effect on milk production and the need to supplement the infant with donor milk or formula. Educate re:

1. Hand expression of milk to protect the woman's breast from mastitis
2. Application of breast milk to nipples after hand expression
3. Active removal of the scab is avoided
4. Twice daily contact with water in the shower is adequate for cleansing
5. Direct breastfeeding should ideally be recommenced in the presence of a clinician able to deliver the gestalt method, or if not possible, the woman requires careful education about the gestalt intervention to address underlying fit and hold problems
6. The frequency of direct breastfeeding should be gradually calibrated to protect her breasts

6. **Breast milk application**
    - Hand expression and application of breast milk regularly if taking complete nipple rest may promote wound-healing
    - If feeding or pumping regularly the nipple is already washed in reastmilk many times a day and additional application is unlikely to be required

7. **Photobiomodulation therapy**
    - Consider light therapy if the nipple pain persists once comprehensive interventions have been applied

8. **Antibiotics may be indicated if:**
    - Severe malodorous thick green/green exudate
        - begin with mupiricin, for 5-7 days
    - Cellulitis spreading beyond wound edge (oral antibiotics)
    - Impetiginous changes: weeping, yellow crusting blisters (clinical judgement re trial of mupiricin or direct commencement of oral antibiotics)
    - Firstline antibiotic treatment is cefalexin 500mg 4 times a day, unless the patient is allergic to penicillins.
    - Swab microscopy and culture is indicated if oral antibiotics are commenced

9. **Specific management strategies are listed below**

What strategies do not help?

Common overmedicalised treatment of nipple pain and damage in lactation	Explanation
Antifungal treatments for nipple candidiasis	Deep stabbing pain between breastfeeds, radiating or burning pain, pink shiny nipple and the white flakes of hyperkeratosis are caused by inflammation and nipple stroma microhaemorrhages due to repetitive mechanical microtrauma
Nifedipine or SSRIs for nipple vasospasm	Vasospasm is autonomic instability caused by repetitive mechanical microtrauma
Frenotomy and bodywork exercises for ankyloglossia	Although classic (anterior) tongue-tie occurs and requires simple scissors frenotomy, normal anatomic variations are typically misdiagnosed as tight oral connective tissues
Antibiotics and antifungals for painful white spots of the nipple, which are diagnosed as subacute mastitis or an extension of intramammary duct biofilm	There are three causes of white spots, discussed here. None require antibiotics or antifungals.
All Purpose Nipple Ointment	This combination of an antibiotic, antifungal and anti-inflammatory steroid should never be used.
Antibiotic ointment or cream (mupiricin) for exudate	A nipple wound's exudate is part of the healing process. Occasionally, an antibiotic is indicated for a true peri-wound cellulitis.
Pharmaceutical intervention for chronic pain e.g. gabapentin, SSRIs, propranolol	Nipple pain and damage in lactation is acute inflammatory pain, which ceases when breastfeeding or mechanical milk removal ceases. The use of medications for chronic pain places the woman at risk of side-effects, without evidenceof, or rationale for, benefits.

SPECIFIC PRESENTATIONS

VASOSPASM OF THE NIPPLE

- Nipple and breast pain associated with visible blanching
- These guidelines propose vasospasm results from repetitive mechanical microtrauma, causing inflammation, which leads to autonomic instability
- Increased likelihood if known primary Raynaud's syndrome or autoimmune disease
- Management:
    - PRIMARY: Eliminate conflicting vectors of force during milk removal utilizing gestalt method of fit and hold
    - SECONDARY OR adjunct interventions:
        - Keep nipples warm between feeds
        - Avoid stimulants such as nicotine
        - Avoid beta-blockers or vasoconstrictor medications (propranolol, pseudoephedrine)
    - No role for nifedipine, amlodipine, diltiazem, verapamil or serotonin reuptake inhibitors, or supplements such as vitamin B6, magnesium, fish oil, calcium or evening primrose oil.

WHITE SPOTS ON THE NIPPLE DURING LACTATION

It is necessary to differentiate between the four types of white spots.

1. **Hyperkeratosis of the nipple (most common)**
    - Thickening of an area of stratum corneum, related to repetitive microtrauma
    - May appear pale white, cream or yellowish
    - May be larger with more diffuse borders than a milk blister
    - May have multiple irregularly sized hyperkeratotic spots
    - Attempts to unroof a hyperkeratotic spot will worsen hyperkeratosis
    - Management
        1. Gestalt intervention to eliminate conflicting vectors of force
        2. Mometasone cream – BD for first day, then daily for 7 days (avoid ointment and occlusion which can lead to overhydration).
2. **Milk blister (occasional)**
    - Exquisitely painful white spot on the nipple face related to an epithelial roof
    - Clearly demarcated border of the white spot
    - May be associated with a lump extending into the breast and milk build up
    - Management
        1. Consider careful unroofing with bevelled needle
        2. Frequent flexible feeding and gestalt intervention to address fit and hold
        3. Advise women not to rub at the nipple with a cloth or fingernail (this can lead to hyperkeratosis)
        4. Mometasone daily for a week if recurrent
3. **Milial cyst (occasional)**
    - Painless, small white dermal cyst of keratin
    - May be more prominent and very white after milk removal
    - Usually disappears with time. No treatment required.
4. **Epidermal inclusion cyst (rare)**
    - Usually preexisting, which may grow larger and become inflamed with the mechanical pressures of lactation
    - If irritated, enlarged and painful, may consider surgical excision of the cyst with its walls intact. Most effective when the lesion is not acutely inflamed.

PERSISTENT LACTATION-RELATED NIPPLE PAIN

Persistent nipple pain is caused by ongoing (chronic) inflammation of the nipple epithelium and/or nipple stroma, which causes nociceptic pain in the dermis, and nociceptic and possibly neuropathic pain in the stroma. This chronic inflammation has been caused by repetitive mechanical microtrauma.

Management

1. Continue to apply fit and hold intervention to eliminate breast tissue drag and mechanical trauma using the gestalt method

2. No role for medications such as SSRIs, gabapentin, propranolol; or pain clinics
3. Consider
    - Trial of antifungal treatment – fluconazole 150mg every 2nd day for 3 doses
        - Candida is more likely if women have taken antibiotics or kept nipples in a moist, humid environment
        - Prolonged courses and other treatments are not indicated - miconazole gel can worsen overhydration; gentian violet is cytotoxic and risks nipple epithelial erosions
        - Infant treatment is only required in the presence of visible candidal plaques
    - Trial of nipple shield use (see information above about suitability)
    - Complete nipple rest for 7-10 days, educating patient about risk to supply.
        - Reintroduce direct breastfeeding in calibrated way, in presence of clinician helping with the gestalt method.
    - Photobiomodulation therapy (see NDC Guidelines for Nipple Photobiomodulation Therapy in Lactation)
    - Weaning and cessation of milk removal if the above measures are ineffective
4. Support the woman as she grieves the loss of breastfeeding despite her challenging journey
5. Utilise self compassion for ourselves if the problem cannot be fixed despite out best attempts

Summary of key steps in management of nipple pain and wounds

- Gestalt intervention for fit and hold
- Educate about risks of overhydration and moisture-associated skin damage
- As much exposure to air as possible, especially at night
- Prevent nipple wound from sticking to breast pad – use lanolin, hydrogel or polymem *judiciously*
- Consider nipple shield use
- Keep pump on lowest possible setting and ensure flange is appropriately fitted
- Consider nipple rest, which may need to be complete rest if pump perpetuates nipple wound, with hand expressing to protect the breast from mastitis.

RESOURCES

Video: How babies breastfeed: the biomechanics of infant suck
https://ndcinstitute.au/free-resources/breastfeeding-lactation-and-feeds/videos/how-babies-breastfeed-the-biomechanics-of-infant-suck-video-and-animation

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