Hand Health. How to prevent and manage soft tissue disorders of the hands.

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The frequently repeated movements so common to the practice of dental hygiene often lead to cumulative trauma disorders (CTDs).\textsuperscript{1,2} Additional behaviors specific to dental hygienists that increase their risk of CTDs include limited hand movements, use of vibrating instruments, and holding stressful body positions.\textsuperscript{3,4} The number of working hours, number of difficult patients treated, and years of practice also affect dental hygienists’ risk status.\textsuperscript{5} Mechanical stress caused by glove use and instrument design may also affect the well-being of practitioners.\textsuperscript{6} Typically, the upper extremities are more prone to CTDs when performing repetitive tasks.\textsuperscript{3}

Carpal tunnel syndrome is the most common type of CTD experienced by dental hygienists.\textsuperscript{7} However, thoracic outlet syndrome, cubital and ulnar tunnel syndrome, extensor wad strain, and glove-induced injuries are also common among dental professionals.\textsuperscript{8} These CTDs have been extensively reviewed in the literature. However, two soft tissue disorders that affect the hands—de Quervain’s disease and Raynaud’s phenomenon—are not as frequently discussed but can have debilitating effects for dental hygienists.

ETIOLOGY OF DE QUERVAIN’S DISEASE
De Quervain’s disease is named for the Swiss surgeon, Fritz de Quervain, who first identified it in five women in 1895.\textsuperscript{7} The cause of de Quervain’s is idiopathic. However, repetitive motions, such as ulnar (bending the wrist in the direction of the little finger) and radial deviation of the wrist (bending the wrist in the direction of the thumb), are considered contributing factors (Figure 1).\textsuperscript{8}

Dental hygiene procedures increase the probability of
placing the wrist in ulnar deviation. To maintain health, dental hygienists must concentrate on keeping the wrist in neutral position during instrumentation. Reaching for dental instruments is another common cause of ulnar deviation. To avoid this, instruments should be placed within easy reach of the patient treatment area.

In de Quervain’s disease, the extensor pollicis brevis and the abductor pollicis longus tendons in the wrist at the base of the thumb become inflamed. Inflammation in these tendons of the thumb can cause pain that extends to the base of the wrist (tenosynovitis) and possibly into the forearm and shoulder. Thumb motion may be difficult and painful, particularly when twisting or pinching/grasping objects. The pain may increase with ulnar deviation of the wrist or if direct pressure is applied to the area. De Quervain’s affects middle-aged women eight to 10 times more frequently than men. Its onset can occur gradually or suddenly.

DIAGNOSIS AND TREATMENT

The Finkelstein test is most frequently used to diagnose de Quervain’s disease. When conducting this test, the patient makes a fist with fingers closed over the thumb and the wrist is bent toward the fifth (little) finger (Figure 2). When the wrist is bent toward the outside, the swollen tendons are pulled through the space in the wrist and stretched, which causes pain. A physical examination is also recommended to rule out any other possible conditions that could cause pain in the same area, such as osteoarthritis, scaphoid (navicular) bone disorders, disruption of the scapholunate ligament, and carpal tunnel syndrome.

Initially, the patient continuously wears a spica splint for 4 to 6 weeks (Figure 3, page 76). This not only immobilizes the affected area, but inhibits activities that may aggravate the condition. Ice may be applied to the affected area for 15 to 20 minutes to reduce inflammation. The area should be warmed for 45 minutes before icing again. If symptoms continue, a physician may prescribe anti-inflammatory medications, such as naproxen or ibuprofen, or inject the area with corticosteroids to decrease the pain and swelling.

Management of de Quervain’s disease with corticosteroid injections is successful in approximately 50% to 80% of patients.

If conservative medical treatment is not successful, outpatient surgery may be recommended. Surgery involves releasing the tendon sheath to relieve pressure or constriction around the tendon, which eliminates the friction that causes inflammation, thus restoring the tendon’s smooth gliding capability. Following surgery, physical/occupational therapy may be recommended to strengthen the thumb and wrist. Recovery times vary, depending on age, general health, and how long the symptoms have been present. Individuals whose disease has developed gradually may be more resistant to treatment.

The clinical management of any CTD is based on identifying and treating individual component pathologies. Referral to a knowledgeable physical/occupational therapist, with an understanding of ergonomic behavioral, postural, and workspace modification, is recommended. Prevention and management of the disease involves:

- Keeping hand/arm in neutral position during instrumentation, avoiding repetitive ulnar deviation of the wrist.
- Placing instruments within easy reach of patient treatment area to prevent ulnar deviation of the wrist.
- Practicing ergonomically correct positions.

RAYNAUD’S SYNDROME

Raynaud’s syndrome is named for the French physician, Maurice Raynaud, who first recognized the condition in 1862. Raynaud’s syndrome, sometimes referred to as a disease or phenomenon, is a type of vascular disease that affects the arteries. There is an interruption of blood flow to the fingers, toes, nose, and/or ears when a spasm occurs in the vessels of these areas. The hands are most commonly affected.

Raynaud’s syndrome can occur alone or in association with other rheumatic diseases. When it occurs alone, it is referred to as Raynaud’s disease or primary Raynaud’s phenomenon. Primary Raynaud’s phenomenon is the most common form of the disorder and is not associated with any underlying disease or medical problem.

Secondary Raynaud’s typically accompanies connective tissues diseases such as scleroderma, systemic lupus erythematosus, Sjögren’s syndrome, rheumatoid arthritis, and polymyositis. Although secondary Raynaud’s is less common, it can be more serious. Signs of secondary Raynaud’s initially appear around the age of 40, whereas the primary form of Raynaud’s occurs indiscriminately.

CONTRIBUTING FACTORS

Arterial spasms from Raynaud’s syndrome are caused by exposure to cold or emotional stress. More important to dental hygienists,
Table 1. Raynaud’s syndrome management for dental hygienists.

<table>
<thead>
<tr>
<th>Instrumentation</th>
<th>Position</th>
<th>Daily Schedule</th>
<th>Recommendations</th>
<th>Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alternate use of vibrating instruments with hand scaling.</td>
<td>1. Maintain neutral seating and hand/arm positions.</td>
<td>1. Incorporate brief (5-10 minutes) breaks in the daily work schedule for rest and stretching exercises.</td>
<td>1. Consult with a physical or occupational therapist or rheumatologist.</td>
<td>1. Prolonged use of vibrating instruments.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Practice stress reduction protocol.</td>
<td>2. Prolonged exposure to cold.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Take niacin (vitamin B3).</td>
<td>4. Nonwork-related activities that constrict the wrist and hand, such as typing, playing the piano, and/or gardening.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Wear gloves when handling cold or frozen items.</td>
<td>5. Stress.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. Exercise regularly.</td>
<td>6. Direct contact with frozen foods or cold drinks.</td>
</tr>
</tbody>
</table>

Additionally, occupational Raynaud’s phenomenon may be caused by thrombosis or clot of the ulnar artery. Raynaud’s phenomenon related to ulnar artery thrombosis is typically unilateral and associated with small blood clots. 

SYMPTOMS

Due to an imbalance of vasoconstriction and vasodilation in Raynaud’s disease, the affected area turns white, then blue, followed by bright red over the course of the attack (Figure 4). Skin discoloration occurs because an abnormal spasm of the blood vessels causes a diminished blood supply to the local tissues. In addition, there may be associated tingling, swelling, or painful throbbing. Chemotherapy is a risk factor for developing these symptoms, especially for patients being treated for ovarian cancer. Figure 4 shows the fingers of a dental hygienist, who is undergoing chemotherapy for ovarian cancer, experiencing Raynaud’s symptoms—red, white and blue fingers—when exposed to prolonged cold temperatures.

While there is no single blood test that identifies Raynaud’s blood work can rule out the presence of autoimmune antibodies associated with scleroderma, lupus, mixed connective tissue disease, undifferentiated connective tissue disease, Sjögren’s syndrome, and other diseases that may have Raynaud’s as a possible component. Differential diagnostic tests include doppler ultrasound, nailfold capillaroscopy, antinuclear antibody test, and erythrocyte sedimentation rate.

DISEASE MANAGEMENT

A physician may prescribe medication to relax the walls of the blood vessels to prevent smooth muscle contraction and arterial damage. Medications prescribed include topical nitroglycerin, angiotensin-converting enzyme (ACE) inhibitors, and calcium-channel blockers, especially nifedipine and sildenafil (Viagra). Transdermal, oral, or topical nitrates may cause adverse effects such as headaches, which can limit their use. Nondrug treatments and self-help measures can also decrease the severity of Raynaud’s attacks and promote overall well-being. Keeping the body, hands, and feet warm is helpful. Other measures include not smoking (constricts blood vessels), minimizing stress, exercising regularly, and having regular physical examinations. In addition, dental hygienists with Raynaud’s should limit their use of instruments that produce vibration.

Lifestyle changes and supplements that encourage better circulation may be effective alternatives for managing Raynaud’s. Niacin, also known as vitamin B3, causes blood vessels to dilate, increasing blood flow to the skin. Although niacin supplements may be useful in treating Raynaud’s, they do cause flushing of the skin, most commonly in the face and trunk.

Other complementary and alternative medicines used to treat Raynaud’s have been tested with positive results. In a double-blind,
placebo-controlled study, the consumption of fish oil showed an increase in digital systolic pressure as well as the time of onset of symptoms after exposure to cold. In addition, evening primrose oil, which is a rich source of gamma-linolenic acid (GLA), demonstrated a decrease in the frequency of Raynaud's attacks. GLA is an omega-6 essential fatty acid that cannot be made by the body and, therefore, must be obtained from food. Also known as polyunsaturated fatty acids, GLAs are found predominately in plant-based oils and are effective in reducing inflammation and stimulating skin growth. Before beginning complementary and alternative medicine treatments, a physician should always be consulted.

PREVENTION

General exercise improves circulation and, therefore, may help prevent or minimize attacks. In addition, smoking should be eliminated since it impairs circulation. Recognizing and avoiding stressful situations may also help control the number and severity of attacks. Specific recommendations for dental hygienists are listed in Table 1.

CONCLUSION

Dental hygienists routinely use instruments that vibrate and perform hand-intensive repetitive movements often in cramped conditions. Therefore, they are at greater risk for developing hand disorders from lack of proper circulatory flow, pinched nerves, and compromised hand positions. Once symptoms develop, timely intervention is essential. A medical evaluation and diagnostic tests provide supplementary information to the physical examination and history. A comprehensive strategy for treatment and prevention is essential for a life-long career in dental hygiene.

References