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# Aberrant proprioception from dental crowns as a cause of unexplained Functional Muscle Weakness: A Case Series

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Background: Unexplained, non-structural muscle weakness often presents a significant diagnostic and therapeutic challenge, frequently leaving patients undiagnosed or with long-term functional impairment. While central or neurological origins are often investigated, the role of altered peripheral proprioceptive input is often overlooked.

Case Presentation: We present three cases of patients suffering from severe chronic pain and functional muscle weakness. In all cases, the muscle weakness could be instantly and reversibly resolved by applying gentle pressure to the biting surface of specific dental crowns. Following the removal of the implicated crown(s), all patients achieved a full and lasting recovery from both the weakness and their concomitant chronic pain.

Discussion: This report proposes a mechanism where aberrant proprioceptive input from metallic dental crowns alters resting muscle tone via the trigeminal and wider nervous system pathways. This clinical observation supports research demonstrating that sensory input from teeth can rapidly modulate muscle excitation and inhibition. These cases suggest that dental restoration materials may be a previously unrecognised cause of functional muscle weakness and chronic musculoskeletal pain.

Indexing Terms: Chiropractic; AK; Applied Kinesiology; proprioceptive medicine; afferentology; dental crowns.

## Introduction

Unexplained muscle weakness presents a significant diagnostic challenge for clinicians. While a small percentage of cases can be attributed to identifiable neurological disorders such as amyotrophic lateral sclerosis (ALS), Guillain-Barré syndrome (GBS), myasthenia gravis (MG), or inflammatory myopathy, (1) the vast majority of patients remain undiagnosed and untreated.

> *'...The nervous system constantly uses alterations in proprioception to adjust muscle tone ...'*

A 12-year longitudinal study by Stone et al on patients presenting with functional unilateral muscle weakness found that 83% still reported weakness or sensory symptoms at follow-up. (2) The majority of these patients reported limited physical function, distress, and various somatic symptoms. Only one of the 42 patients investigated had developed an identifiable illness that explained their original presentation at the time of follow-up. (2)

The aetiology of functional muscle weakness is often unknown. Many studies have identified a correlation between muscle weakness and joint pain with the frequent assumption that the

weakness is secondary to the joint injury. (3, 4) More recently, a few studies have suggested that the pain may actually be a secondary consequence of the primary weakness. (5, 6)

Muscle weakness has been linked to a wide range of co-morbidities, including:

- Osteoarthritis (OA) (3, 7)
- Sarcopenia (Age-related loss of muscle mass and strength) (8)
- Lumbar Spinal Stenosis (LSS) (9)
- Rotator Cuff Tendinopathy/Tears (10)
- Rheumatoid Arthritis (RA) (11)
- Joint Instability (5, 12)
- Functional Disability (13)
- Frequent Falling in the Elderly (6)
- Depression (14)

Additionally, muscle weakness has been linked to increased mortality. (15)

Experimental evidence supports a central mechanism for muscle inhibition. For instance, a Danish research team found that inducing peripheral muscle pain reduced the maximal torque produced during isometric knee extension. However, the muscle's inherent contractile properties, as assessed by twitch interpolation, were unaffected. They concluded that this muscle inhibition was centrally mediated, despite the sensory stimulus being peripheral. (16)

Current medical practice often fails to emphasise the importance of functional muscle testing in both children and adults, potentially leading to the majority of functional weakness cases going undetected. (17)

This paper presents three cases where the primary complaints were severe chronic pain accompanied by functional muscle weakness. In each case, the weakness was instantly and reversibly resolved by applying pressure to a specific dental crown, presumably altering the proprioceptive input from the tooth. Full recovery was achieved after the removal of the implicated crown(s).

## Case presentations

### *Case 1*

Mrs LP, a 49-year-old female, presented with a 15-year history of progressive, severe, unexplained muscle weakness accompanied by chronic back pain, generalised joint pain, numbness, and limb heaviness. Her management history included extensive exercise, analgesia, and exploratory spinal surgery four years prior to presentation, all without lasting benefit. The onset of symptoms appeared to correlate with the time of her second pregnancy, though there was no history of trauma.

#### *Physical Examination and Testing:*

LP was slightly overweight and exhibited a profound paucity of movement. Ordinary activities such as standing and walking required extreme effort, and her gait was slow and unsteady. She reported an inability to prevent herself from collapsing to the ground while dismounting a horse. She could not step off a low chair unassisted. Her range of motion was unrestricted, and standard orthopaedic and neurological tests were unremarkable.

Her muscle weakness was significant. When asked to perform a supine straight-leg raise as quickly as possible, the voluntary lift from horizontal to vertical took 10 seconds for each leg. She was unable to lift both legs simultaneously or perform a bent-leg sit-up. Assessment by an independent practitioner in a local gym showed her to take 7 seconds to lift 5lbs 2.2kg in a leg

extension machine, yet she was able to lift 25lbs 11.3kg easily with digital pressure on any of her crowns.

*Intervention and Outcome:*

Oral examination revealed three gold crowns on the lower right #4, lower left #6, and upper left #6. These crowns were later confirmed to have been placed approximately 6 months before the birth of her second child. During the examination, steady pressure was applied to the occlusal (biting) surfaces of each crown in turn.

On applying pressure to the implicated crowns, her strength instantly normalised:

- Her supine straight-leg lift time immediately reduced from 10 seconds to 2 seconds
- She was easily able to lift both legs together
- She performed a bent-leg sit-up without difficulty
- Pressure on other teeth had no effect.

These changes were consistently reproduced over three separate visits and documented on video.

Without prior knowledge of the expected outcome, a dentist was consulted. The crown on the lower left #6 was removed, and the tooth at the lower right #4 was extracted. That night, the patient reported being able to sit on the floor with crossed legs for the first time in 10 years.

Three days later she was examined and found to have full and normal muscle power. Her leg-lift times were consistently 2 seconds, she moved freely and quickly, and could even perform a standing leg-lift higher than shoulder level. The third crown was subsequently removed. She has since made a full and complete recovery from her back pain and residual disability with an eight year followup.

### *Case 2*

Mrs JH presented with severe low back pain. A month of conservative, standard management provided no benefit. Straight-leg raising was negative bilaterally, and orthopaedic and neurological testing was otherwise negative.

*Physical Examination and Intervention*

Manual muscle testing revealed weakness in all the proximal muscles of her left hip, left shoulder, and left neck flexors (unilateral pattern). Placing pressure on a gold crown on one of her molars instantly abolished this proximal unilateral weakness. She was advised to have the crown removed.

One week later, the patient was re-examined with the crown still in place, and identical findings were noted. Her weakness persisted, and she was nearly bed-ridden due to the pain.

*Outcome:*

Later that day, she had the crown and some underlying amalgam material removed in one piece. As an experiment, the gold/amalgam crown was placed in the patient's saliva, and the voltage between the two metals was measured at 175 mV using a standard digital multimeter. She was up and walking within 2 days, asymptomatic in 1 week, and has remained pain-free while actively playing tennis during a two year follow-up.

## *Case 3*

### *Presenting Complaint and History:*

The patient, BH, a 40-year-old firefighter, presented with a 10-year history of chronic low back pain. His symptoms were significant enough to cause a one-month absence from work in the month prior to presentation, and a recent acute episode prevented him from working and performing simple daily tasks, such as putting on socks.

The most recent flare-up occurred when he felt something 'pop' while he was leaning forward. The patient also reported prior aggravation of symptoms following golf. He has an infant and baby at home, which may contribute to physical strain.

### *Medical and Treatment History:*

Prior diagnostic scans revealed an L5 disc bulge. Management of the condition had previously included two spinal block injections and a course of physiotherapy. He manages acute pain episodes with GP-prescribed painkillers.

### *Initial Clinical Findings:*

Initial examination revealed widespread musculoskeletal weakness, including:

- Unilateral inhibition (weakness) in the right peroneus longus
- Bilateral inhibition (weakness) of adductors, quadratus lumborum, pectoralis major, neck flexors, hamstrings, and gluteus maximus.

These multiple, non-contiguous muscle weaknesses were correlated with a specific dental issue: a lower right '7' bonded porcelain crown. Correlation was noted when the patient bit moderately on a dental cotton roll on the lower right 7 and this resulted in the immediate strengthening of the previously inhibited muscles, a reaction that was absent when the patient bit on any other tooth.

Although the patient had '*a lot of other fillings*' and an intense dislike of dentists, he was subsequently referred to a dentist for assessment of the crown.

### *Treatment and Outcome:*

Following the initial consultation, the patient had the porcelain crown removed.

### *Immediate Post-Intervention Status:*

Immediately following the crown removal, the patient reported that

- '*straight away all problems [were] gone*'.
- He reported being fine, even with '*lots of aggravation at work*'.
- He had 'no problems' playing with his kids.
- His golf performance was '*much better*', although '*not perfect*'.

Follow-up (7 days later):

- The patient reported 'Very good' progress.
- After playing golf, his pain level was only 2-3 out of 10, a significant improvement from the previous severity of 8.

Follow-up (14 days later):

- The patient reported continued improvement and a '*Slight recurrence*' of symptoms the day before, following golf played in cold weather.
- Treatment included chiropractic adjustments to L4, L5, T8, and C7.

The case suggests a significant, rapid resolution of chronic, debilitating low back pain and widespread musculoskeletal weakness immediately following the removal of a specific dental restoration.

## Discussion

Muscle tone, or the constant low-level force exerted by a resting muscle, is fundamentally dependent on proprioceptive input from a variety of peripheral receptors. Of these, muscle spindles are the only proprioceptors that generate constant afferent input, continuously signalling the amount of tension or stretch on the muscle fibres. This continuous input is essential for: Immediate reflex control of movement; Providing information to higher centres for volitional control; Activating a continuous flow of motor output from the alpha motor neurons (AMN) to establish resting muscle tone.

While the proprioceptive role of ligaments is often discussed, the constant, proportional feedback about muscle tension and tone relies primarily on muscle spindles (18).

The nervous system constantly uses alterations in proprioception to adjust muscle tone. AMNs maintain a baseline resting muscle tone by firing at approximately 50 Hz. This efferent output rate is regulated by motor intent from the brain, constant feedback from muscle spindles, and inhibitory/excitatory impulses from receptors in the skin, joints, tendons, and ligaments.

Research specifically illustrates the mechanism by which input from a tooth can modulate muscle function. Turker et al (11) studied the reflex responses of motor units in the human masseter muscle to mechanical stimulation of a central incisor tooth. They placed electrodes in the masseter muscle to measure facilitation or inhibition. Applying a steady pressure to the tooth caused the muscle to move into an excitatory state, while a brisk tap caused immediate muscle inhibition. This mechanism is protective: excitation allows for a strong bite when needed, and inhibition protects the teeth from unexpected, hard contact. Although Turker didn't measure facilitation and inhibition in non-bite muscles it is commonly found that unexpectedly biting on a stone while eating will active a whole-body response.

> Clinically we find that pressure into an irritated tooth will provoke facilitatory reactions in inhibited muscles and inhibitory reactions to normal muscles, as per the cases reported here.

The three cases presented here strongly suggest that aberrant proprioceptive input originating from the dental crowns, likely due to their mechanical properties (eg fit, material, or galvanism in Case 2), can generate inappropriate or disruptive afferent signals. These signals appear to have centrally inhibited resting muscle tone, leading to the observed functional weakness and subsequent musculoskeletal pain. The instant and reproducible normalisation of muscle power upon the application of pressure (which temporarily changed the proprioceptive input) and the complete resolution of symptoms upon crown removal provide compelling evidence for this etiological link.

## Proposed Mechanism

### *Dental Proprioception and Muscle Tone*

The mechanism operates through the continuous disruption of normal, balanced sensory input to the central nervous system (CNS), specifically concerning the resting state of muscles.

*1. Aberrant proprioceptive input from the tooth*

- Dental Proprioceptors: Each tooth and its surrounding structures (the periodontal ligament) are densely packed with mechanoreceptors.1 These receptors are a specialised type of proprioceptor, constantly feeding information to the brain about the force, direction, and timing of contact on the tooth's surface, whether during biting or at rest.
- The Crown as an Altered Sensor: A dental crown, especially if it has an imprecise fit, is made of a different material (like metal), or is part of a galvanic cell (as suggested in Case 2), fundamentally changes the tactile and mechanical environment of the tooth. This leads to the generation of aberrant afferent signals, sensory information that is constant, inappropriate, or distorted compared to the natural tooth structure.

*2. Central modulation of muscle tone via the Trigeminal System*

- The Trigeminal Connection: The sensory nerves from the tooth travel via the trigeminal nerve (mandibular division). The input then projects into the trigeminal brainstem nuclear complex. From here, the signals are rapidly integrated and distributed to higher centres (for conscious perception) and to motor control centres.
- Reflexive Muscle Inhibition: The key evidence cited (Turker et al) shows that sensory input from a tooth can rapidly and dramatically modulate muscle activity.
  - A steady pressure (like a normal bite) causes a muscle excitation reflex.
  - A brisk tap (like biting unexpectedly on something hard) causes a powerful muscle inhibition reflex to protect the tooth.
- The Proposed Fault: The aberrant input from the faulty crown is hypothesised to continuously 'mimic' a constant, low-level inhibitory signal, or simply be so disruptive that it overwhelms the normal homeostatic feedback loop.

*3. The Result: Functional muscle weakness*

- Muscle Tone Regulation: All muscles maintain resting muscle tone (a low level of continuous contraction) supplied by the firing rate of the Alpha Motor Neurons (AMN), typically around 50 Hz. This firing rate is regulated by the balance of excitatory and inhibitory signals from the periphery (proprioceptors) and the brain.
- Central Inhibition: When the aberrant dental signal is channeled into the motor system, it creates a continuous central inhibitory drive. This signal effectively dials down the firing rate of the AMNs supplying certain muscle groups (e.g., the proximal muscles found weak in our cases).
- Functional Weakness: The muscles are structurally and neurologically intact (no damage to the muscle fibre or peripheral nerve), but the motor output is centrally suppressed. This results in functional weakness, a reduction in voluntary contractile force that is immediately and reversibly normalised when the source of the aberrant signal (the crown pressure) is temporarily changed, or permanently removed.

*In summary:*

The dental crown acts as a source of chronic, low-grade aberrant proprioceptive noise which, through the trigeminal nervous system, triggers a continuous state of central inhibition on the alpha motor neurons, leading to functional muscle weakness in connected (and possibly distant) muscle groups.

The pain is then secondary to the resulting muscular imbalance, joint instability, and chronic strain.

## Conclusion

These three cases illustrate a novel presentation of unexplained functional muscle weakness and chronic musculoskeletal pain caused by altered proprioceptive input from dental crowns.

Given the prevalence of dental restorations and unexplained muscle weakness, further research into the neurophysiological link between dental proprioception and systemic muscle function is warranted.

The potential for such a simple, non-invasive intervention (crown removal) to resolve long-standing, severe disability warrants clinicians to consider the state of dental restorations in the diagnostic workup of functional muscle weakness.

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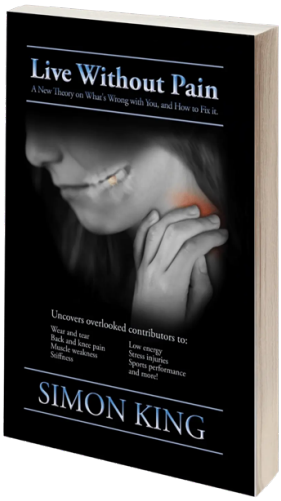
## About the author

Simon King graduated as a chiropractor in 1986 from RMIT (then PIT) in Melbourne, Australia. He first practiced on the Gold Coast in Australia before taking up a teaching post at the Anglo-European College of Chiropractic in Bournemouth, England.

He has been in private practice ever since in the UK and Australia, currently in Berkhamsted, Hertfordshire, UK.

As his practice developed, he became fascinated by the fact that certain patients responded to treatment easily while others did not and the reasons for these differences could not be explained by current knowledge or understanding.

Simon became a diplomate of the ICAK in 1996 and has been teaching the paradigm of proprioceptive medicine and afferentology ever since.

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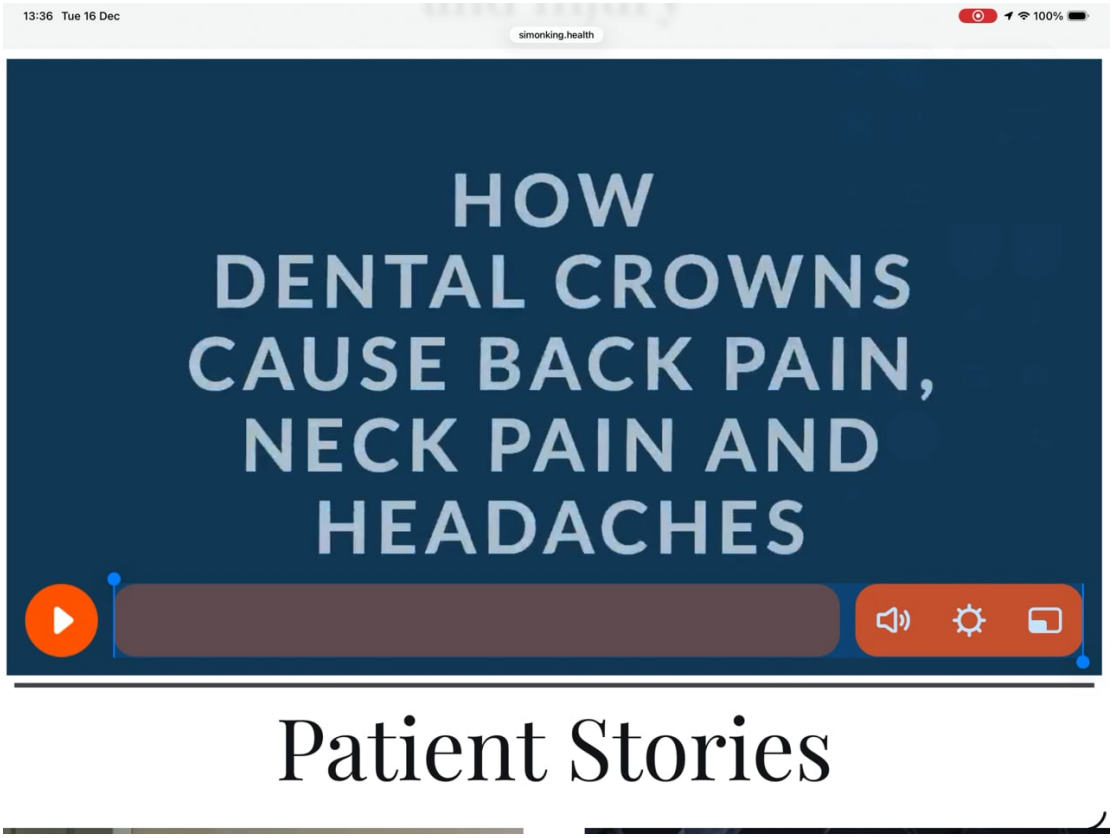
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