

Improvement in thoracic alignment and bone density in a 65-year-old female with six compression fractures and severe osteoporosis following two weeks of concentrated chiropractic care: A case report

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Background: A 65-year-old female with a complex medical and personal history presented for Chiropractic care with primary concerns relating to overall wellbeing, and whose initial testing revealed severe osteoporosis.

Intervention: The patient commenced concentrated Chiropractic care using the Averio Functional Neurological technique which deploys a high-number of low force adjustments over the course of five days inpatient care.

Outcomes: Following two separate weeks of concentrated care, the patient reported improvements in sleep quality, energy levels, mood stability, and daily functional capacity. Repeat testing also revealed significant improvements in bone density.

Conclusion: This case demonstrates a role for Chiropractic care in supporting improvements in bone density and remodelling.

Indexing Terms: Chiropractic; subluxation; concentrated care; osteoporosis; scoliosis; well-being.

Introduction

When discussing the innate, natural regenerative potential of the tissues of the human body, we must consider that the human skeletal system is one of the most robust regenerative tissues. (6) Bones are dynamic tissues that are in a constant state of regeneration, with specialised cells called

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osteoblasts in a constant state of bone repair, as well as specialised cells called osteoclasts in a constant state of bone breakdown. (3)



Bone tissues have multiple methods of regenerative capacity, with the most well-recognised pathways being those of mechanical stress. (2, 10) This process has been examined to the point of understanding the amount of force required to allow for increasing bone density, which is found between 1500-3000 μm microstrain region, with a bone fracture of normal bone density found above 25,000 μm microstrain. (10)

A Chiropractic analysis of this function would be to say that as a person does work, the central nervous system will regulate changes in cellular bone remodelling to support the work; so the bone density of the femurs of a weight lifter will differ from the bone density of a quilter, even if both individuals are the same age and gender and have access to the same nutrients. Outside of mechanical remodelling, there are also notable chemical, hormonal, immunomodulatory, and neurological bone remodelling strategies that the human body was designed with to allow it to have adequate bone density throughout life. (6, 11, 12, 13)

Given the human skeletal system's numerous avenues for tissue repair and regeneration, it is curious and confounding that osteoporosis, characterised by the pathological loss of bone density often associated with abnormal aging, is so prevalent. A 2021 meta-analysis showed a prevalence of osteoporosis at a rate of 23.1% worldwide, specifically in women, with the highest frequency being 39.5% in women specifically in Africa. (7)

A 2025 review specifically looking at osteoporosis data in the United States from 2005-2018 found that a staggering 69.12% of individuals with osteoporosis went undiagnosed. (8) Additionally, the review found that the prevalence of osteoporosis in the United States was substantially higher than that found globally, with estimates of 35% of the female population aged 50 and older to have diagnosable osteoporosis. The review also shows that the number of both men and women with osteoporosis has been steadily growing since 2005, with each couple of years showing a greater and greater burden of the disease. (8)

One simply must question how and why osteoporosis is being found in one-third of women in the United States, even though bone tissue has an innate ability to repair, regenerate, and heal. The answer is likely found in the central nervous system, as bone regeneration, as well as all tissue regeneration, is a product of the electrical signal regulation of the central nervous system. (14 - 19).

A 2024 study published in the European Journal of Medical Research holds that the '*brain-bone axis has emerged as a captivating field of research, unveiling the intricate bidirectional communication between the central nervous system (CNS) and skeletal metabolism*', specifically in the modulation of bone remodelling. (15) A 2018 review published in the Journal of Physiology Review states '*the presence of autonomic nerves within the skeleton transitioned from a mere histological observation to the mechanism whereby neurons of the central nervous system communicate with cells of the bone microenvironment and regulate bone homeostasis*'. (16) This is a conversation that has long been held among Chiropractors yet silenced in the medical field.

There is an intimate connection through the central nervous system to all tissues, including bone tissues, and that connection often determines whether a person can age normally or will age with disease.

Studies have shown that Chiropractic care positively affects the brain and central nervous system function and regulation, and as such, it has the potential to positively affect bone pathology and restore innate regeneration cycles through positively influencing the central nervous system. (1, 20 - 27)

Additionally, Chiropractic care may affect bone health through secondary measures such as improving movement patterns and posture, which may encourage weight-bearing activity and improve balance. Both of these factors are well-established contributors to stronger bones and reduced fracture risk. For example, studies show that mechanical loading, such as that which occurs during exercise or movement, stimulates bone formation and maintains density. (4) By improving mobility and decreasing pain, chiropractic care may indirectly increase a patient's participation in physical activity, creating a positive feedback loop for bone health.

While further studies are needed, as is always the case, it can be strongly suggested that improved nervous system function, enhanced movement, and increased mechanical loading of the skeleton may be vital in bone density and positive aging.

This case report contributes to this growing area of inquiry by examining changes in bone density following subluxation-based Chiropractic care.

Case details

A 65-year-old female with a moderate physical activity level, presented as a new Chiropractic patient. She reported a significant medical history beginning with a closed head injury sustained in a motor vehicle accident in 1984, which she identified as the onset of her longstanding health concerns. The patient further reported a history of skiing/snowboarding, horseback riding, past marijuana use, past alcohol use, and a full schedule of vaccinations (excluding COVID-19/MRNA vaccination). She reported significant mould exposure during her time living in Texas for approximately 9-12 years, but remarked that the mould was never tested or resolved.

The patient also reported that she had mercury amalgams in her mouth that had not been removed. Along with her medical history, she reported past opioid use, past hormone replacement use, and past NSAID/Tylenol use, and described a history of extended mental and emotional stress and/or abuse. The patient reports a past and current history of anaemia, arthritis, balance issues, diabetes, high cholesterol, loss of smell, numbness, osteoporosis, and surgery. She further reported that the surgeries she received were reported as appendectomy, cholecystectomy, and hysterectomy, and that she had documented allergies to codeine, hydrocodone, and morphine.

While the patient presented with primary complaints of severe osteoporosis with severe compression fractures in the anterior T5-T10 vertebrae, she also reported a long history of other illnesses. These included epilepsy, type 2 diabetes, arthritis, and anaemia, as well as symptoms from a previous head injury, fatigue, brain fog, memory loss, and balance/mobility challenges, all of which factored into her decision to pursue concentrated Chiropractic care.

Clinical findings

Upon presentation, our standing intake tests were undertaken to establish this patient's baseline. Tests included pre- and post-spinal EMG, body composition testing, modified CTSIB (functional brain testing), vitals examination, bilateral blood pressure, bilateral weight testing,

bilateral pulse oxygen, breath test, salivary nitrogen oxide test, patient-reported symptom analysis, and post-spinal radiographic review. Other measures used in this case included pre- and post-analysed spinal radiographs and pre- and post-provoked urine analysis for total toxicity (heavy metals, environmental toxins, and mycotoxins).

Her examination revealed significant ligament instability in the cervical spine. All joints except C1 were noted as unstable in extension. Cervical spine ligament instability noted at multiple levels:

- ▶ C2–C3: 13.5° wedging instability
- ▶ C3–C4: 19.5° wedging instability
- ▶ C4–C5: 3.8 mm extension translation instability
- ▶ C5–C6: 17.6° wedging instability
- ▶ C6–C7: 11.4° wedging instability

Additionally, the thoracic spinal instability was noted as unstable at T2–T3 (3.6 mm), T5–T6 (3.4 mm), T11–T12 (4.2 mm).

Provoked Urinalysis taken upon presentation revealed toxicities rising above the 95th percentile in Aflatoxin B2, Chaetoglobosin, Fuminosins B2, Fuminosins B3, Ochratoxin A, Zearalenone, 2-Hydroxyisobutyric acid (2HIB), and Glyphosate. This is a severe toxicity with the prevalence of the toxicity burden being mycotoxins, or mould toxins. Mycotoxins are often referred to as secondary metabolites produced by certain strains of toxic mould. Mycotoxins negatively impact the central nervous system by penetrating glial cells and disrupting cellular genetics, leading to various diseases and dysfunctions. (28) Mycotoxins are also well-researched in their role in increasing systemic inflammation and mast cell activation. (29)

This is relevant to this case as bone, by nature, is alkaline, and if the extracellular matrix of alkaline tissues becomes acidic or inflammatory over time, that will have a negative effect on the mineral density. Due to the lack of doctors (of any specialty) trained and experienced in toxicology testing and effective toxicity removal, problems with mould toxins, environmental pollutants, and heavy metals often go undiagnosed and unaddressed. This is a significant issue in health care and one that would be most appropriately addressed by Doctors of Chiropractic due to their extensive training in neurology, physiology, the spinal system, and overall body function.

The patient also tested in the 75th to 95th percentile in Aflatoxin B1, Aflatoxin M1, Citrinin (CTN), Fumonisin B1, Barium, Cesium, Mercury, Thallium, Butylparaben, Dimethylthiophosphate (DMTP), Phenylglyoxylic Acid (PGO), and Triclosan (TCS). This patient tested with twenty named poisons in all three cases of toxicity: heavy metals, environmental toxins, and mycotoxins. It is important to note that throughout decades of her medical management with worsening chronic conditions, this was the first time that the patient had been tested for toxicity.

This highlights a critical distinction between medical and Chiropractic management: the patient had a team of medical specialists, none of whom were attempting to determine the cause of the patient's disease(s), as disease is considered the norm for that patient. Medical management is the management of chronic conditions. Under chiropractic management, the primary goal is the determination of the cause of disease because health is considered the norm for the patient.

Chiropractic management involves reversing chronic conditions, provided the patient is committed to the process of removing the damage from their system.

The patient tested with 4.2lbs 1.9kg of bone mass on body composition testing, which would indicate severe osteoporosis in combination with the patient's DEXA (dual energy X-ray absorptiometry) scan.

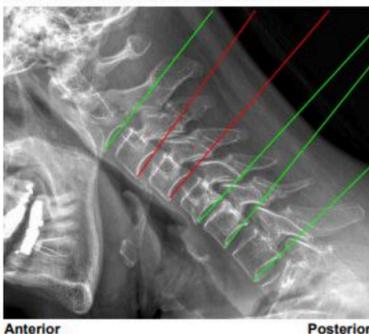
Chiropractic subluxation was identified at every level of the spine. Severe ligament instability in the cervical and thoracic spine, specifically in extension movement in the cervical spine, showed significant spinal injury that was compromising the integrity and function of the central nervous system. The American Medical Association lists a single area of spine ligament instability as a 25-28% whole-body impairment rating in their DRE IV classifications. This patient had nine areas of ligament instability at the time of starting concentrated Chiropractic care. This is an extremely high impairment rating, and combined with the severe toxicity burden of the patient, is likely the cause of a majority of their health concerns.

X-RAY Instability Analysis Comparison

Lateral Cervical Flexion/Extension:
11/13/2023 vs. 6/7/2024

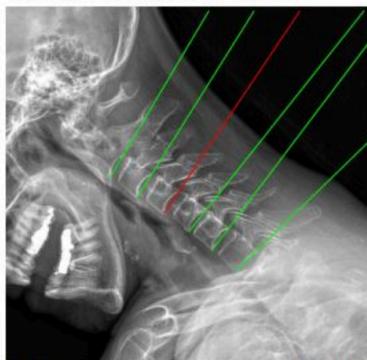
Name: [REDACTED]
Date of Birth: [REDACTED]

1: Lateral Cervical Flexion 11/13/2023



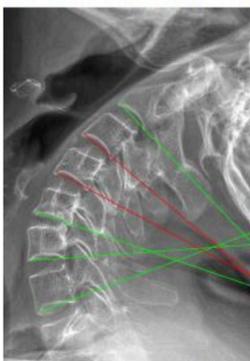
Anterior Posterior

2: Lateral Cervical Flexion 6/7/2024



Anterior Posterior

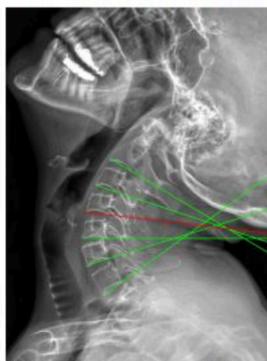
1: Lateral Cervical Extension 11/13/2023



Anterior Posterior

The green line represents vertebrae motion below the ratable threshold for alteration of motion segment integrity.
The red line represents vertebral motion above the ratable threshold indicating alteration of motion segment integrity.

2: Lateral Cervical Extension 6/7/2024



Anterior Posterior

X-RAY Instability Analysis Comparison

Lateral Cervical Flexion/Extension:
11/13/2023 vs. 6/7/2024

Endplate Analysis for Flexion/Extension positions

Segment	Normal Values	Xray 1 Flexion	Xray 2 Flexion	% Change: Xray 1 to 2	Xray 1 Extension	Xray 2 Extension	% Change: Xray 1 to 2
C2-C3	n/a	-2.5°	1.4°	156.0%	-6.3°	-12.5°	98.4%
C3-C4	≤ 11° *	5.2°	1.8°	65.4%	-12.2°	-11.8°	3.3%
C4-C5	≤ 11° *	2.0°	4.6°	130.0%	-9.3°	-6.7°	28.0%
C5-C6	≤ 11° *	-3.7°	-1.4°	62.2%	-23.2°	-17.3°	25.4%
C6-C7	≤ 11° *	7.0°	8.8°	25.7%	-16.5°	-18.7°	13.3%

* The value refers to the difference between this and the previous or subsequent line. The absolute larger of the two is highlighted.
Values in Red Exceed Established Normal. Note that Extension x-ray is NOT rated for angular instabilities.
Direction of measured displacements are indicated using the right-hand cartesian coordinate system method in biomechanics. Consequently a "*" negative sign preceding a measured value indicates posterior translation for linear movements, and a "-" preceding angular measurements indicate relative segmental or global extension rotational movement.

Segment	Xray 1 Flexion	Xray 2 Flexion	% Change: Xray 1 to 2	Xray 1 Extension	Xray 2 Extension	% Change: Xray 1 to 2	Normal Values	Xray 1 Excursion	Xray 2 Excursion	% Change: Xray 1 to 2
C2-C3	0.3 mm	0.0 mm	100.0%	-2.6 mm	-2.4 mm	7.7%	≤ 3.5 mm	2.9 mm	2.4 mm	17.2%
C3-C4	1.0 mm	0.6 mm	40.0%	-2.7 mm	-2.3 mm	14.8%	≤ 3.5 mm	3.7 mm	2.9 mm	21.6%
C4-C5	0.3 mm	0.2 mm	33.3%	-3.8 mm	-3.5 mm	7.9%	≤ 3.5 mm	4.1 mm	3.7 mm	9.8%
C5-C6	0.3 mm	0.3 mm	0.0%	-2.9 mm	-1.5 mm	48.3%	≤ 3.5 mm	3.2 mm	1.8 mm	43.8%
C6-C7	1.2 mm	0.7 mm	41.7%	-1.7 mm	-0.6 mm	64.7%	≤ 3.5 mm	2.9 mm	1.3 mm	55.2%

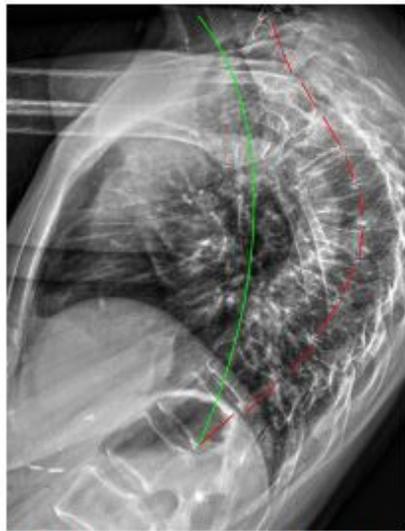
Values in Red Exceed Established Normal
Direction of measured displacements are indicated using the right-hand cartesian coordinate system method in biomechanics. Consequently a "*" negative sign preceding a measured value indicates posterior translation for linear movements, and a "-" preceding angular measurements indicate relative segmental or global extension rotational movement.

Penning Analysis Total Average Angular Excursion

Segmental Angular Excursion	Normal Values (Penning*)	Normal Values (Dvorak**)	Normal Values (Wu***)	Xray 1 Values	Xray 2 Values	% Change: Xray 1 to 2
C2-C3	12.0°	12.0°	13.5°	5.4°	14.9°	175.9%
C3-C4	18.0°	17.2°	17.3°	18.0°	5.7°	68.3%
C4-C5	20.0°	21.1°	22.6°	12.7°	18.0°	41.7%
C5-C6	20.0°	22.6°	19.1°	20.5°	22.8°	11.2%
C6-C7	15.0°	21.4°	18.0°	18.6°	13.0°	30.1%

* see Reference 6
** see Reference 5
*** see Reference 7
Values in Red Exceed Established Normal

1: Lateral Thoracic 11/13/2023



Anterior Posterior

2: Lateral Thoracic 6/7/2024



Anterior Posterior

This green line represents the Normal Spinal Position and expected path of the posterior longitudinal ligament.

This red line represents the patient's position known as George's Line. This is the path of the posterior longitudinal ligament.

RRA per Segment	Normal Values	Xray 1 Values	Versus Normal	Xray 2 Values	Versus Normal	% Change: Xray 1 to 2	Translation per Segment	Xray 1 Values*	Xray 2 Values*	% Change: Xray 1 to 2
T1-T2	-1°	-2.7°	170.0%	3.1°	410.0%	214.8%	T1-T2	-0.6 mm	0.2 mm	133.3%
T2-T3	4°	-6.0°	250.0%	-5.0°	225.0%	16.7%	T2-T3	3.6 mm	0.2 mm	94.4%
T3-T4	5°	-1.4°	128.0%	-4.6°	192.0%	228.6%	T3-T4	0.3 mm	1.2 mm	300.0%
T4-T5	6°	12.3°	105.0%	7.7°	28.3%	37.4%	T4-T5	-0.4 mm	-0.3 mm	25.0%
T5-T6	5°	11.7°	134.0%	31.4°	528.0%	168.4%	T5-T6	3.4 mm	2.2 mm	35.3%
T6-T7	6°	12.6°	110.0%	4.5°	25.0%	64.3%	T6-T7	2.3 mm	2.3 mm	0.0%
T7-T8	6°	18.6°	210.0%	14.4°	140.0%	22.6%	T7-T8	-0.4 mm	1.6 mm	500.0%
T8-T9	4°	5.8°	45.0%	7.8°	95.0%	34.5%	T8-T9	0.4 mm	-2.7 mm	775.0%
T9-T10	3°	14.7°	390.0%	7.4°	146.7%	49.7%	T9-T10	2.4 mm	1.3 mm	45.8%
T10-T11	3°	0.6°	80.0%	10.5°	250.0%	1650.0%	T10-T11	-1.3 mm	-0.4 mm	69.2%
T11-T12	3°	2.7°	10.0%	2.2°	26.7%	18.5%	T11-T12	-4.2 mm	-1.5 mm	64.3%

RRA = Relative Rotational Angle of Measurement

* Values in Red Exceed Established Normal (AMA 5th Edition 2.5mm 6th Edition not rated)

Global Analysis	Normal Values	Xray 1 Values	Versus Normal	Xray 2 Values	Versus Normal	% Change: Xray 1 to 2
ARA T1-T12	44°	69.0°	56.8%	79.5°	80.7%	15.2%
ARA T2-T11	42°	69.0°	64.3%	74.2°	76.7%	7.5%
ARA T3-T10	37°	74.4°	101.1%	68.7°	85.7%	7.7%
Translation T1-T12	0 mm	-53.2 mm	53.2 mm	5.1 mm	5.1 mm	109.6%
Translation T2-T11	0 mm	-30.1 mm	30.1 mm	15.4 mm	15.4 mm	151.2%
Translation T3-T10	0 mm	-16.9 mm	16.9 mm	18.5 mm	18.5 mm	209.5%

ARA = Absolute Rotational Angle of Measurement

Management

The patient commenced a course of concentrated Chiropractic care during which she was checked, adjusted, and treated according to the Averio FNT adjusting technique over two weeklong programs, a total of 10 days of concentrated Chiropractic care. Sixty-two Chiropractic adjustments were delivered during the first weeklong program (March 2024), and sixty-five during the second weeklong program (June 2024). Averio FNT adjustments are delivered via low-force, sustained contact with the patient's spine according to technique objectives and guidelines.

A total of 127 chiropractic corrections were delivered, with the pre- and post-assessments being conducted within a four-month period.

Additional care recommendations:

- ▶ Whole food, anti-inflammatory diet recommendations.
- ▶ Spinal and functional neurological exercises.
- ▶ Active and passive motion therapies.
- ▶ Hot and cold therapies include ice massage, hot water/cold plunge, and contrast therapy.
- ▶ Photobiomodulation class 2 laser protocols
- ▶ Nutritional therapy protocols include whole food and minimally processed supplementation.

The patient was recommended an Averio weeklong program every four months until her spinal damage was reversed. Customised nutritional protocols are used at various points in the case to support bone regeneration and/or customised detoxification for the patient's specific needs.

Misalignment and gross deformity in the cervical and thoracic spine were the primary areas of focus, with ligament instability in the cervical and thoracic spine also representing a significant area of focus. Stated aims of care were to reduce and/or reverse the patient's seizure activity and abnormal bone loss (i.e., osteoporosis), and to improve quality of life and overall health outcomes.

Outcomes

The patient achieved a significant improvement in bone density while under concentrated Chiropractic care and is scheduled for another review with her primary medical provider concerning her diagnosis of osteoporosis. Additionally, significant positive changes were noted across numerous repeated objective tests.

These included an improvement in spinal EMG from 1179 on the Monday of her first weeklong program to 310 on the Friday of her second weeklong program (normal is between 100 and 150). A significant improvement in bone mass was also noted, with an increase from 4.2lb 1.9kg to 4.4lb 2kg on bone composition testing. The patient noted an increase in her ability to stand without pain from three hours to four hours on intake.

The patient initially failed all areas of the Modified CTSIB testing (i.e., digital balance and fall risk assessment). After her second weeklong program, she has seen marked improvement in the visual cortex from 9% to 29%. An ideal normal score would be over 80% and thus, while a significant change, room for more improvement remains. Post-program testing also revealed repair of all thoracic ligament instability following the second weeklong program. Her thoracic spine moved 109% towards normal, and ligament instability at C3-C4 reversed following the second weeklong program of concentrated chiropractic care.

Note: Although this patient has not completed their prescribed Chiropractic care at the time of publishing this case, and it is expected that further gains towards normal function and physiology are likely, this case was selected for publication at this time due to the

outstanding structural changes in the thoracic spine, even though the patient presented with multiple compression fractures.

Discussion

This case highlights the potential role of concentrated Chiropractic care in improving quality of life and structural outcomes for individuals with complex conditions, including severe osteoporosis. The patient initially attended the clinic while supporting another individual who had experienced significant cognitive impairment following an adverse reaction to anaesthesia during a routine surgical procedure. After observing this individual's cognitive progress under Chiropractic care, she elected to begin care herself. This is enhanced well-being.

During her two-week period of concentrated care, the patient reported improvements in several key areas, including sleep quality, energy levels, mood stability, and daily functional capacity. She also demonstrated increased confidence in her ability to actively manage her health through practical strategies introduced during care. These changes were particularly notable given her previous experiences with conventional medical management, where she had been advised that no further interventions were available.

Radiographic evaluation during this period revealed marked structural improvements in the thoracic spine, even in the presence of multiple compression fractures. These objective changes form the basis for the case's selection for publication. Ongoing follow-up, including repeat medical testing for osteoporosis, is scheduled and may provide additional data to further clarify the long-term effects of care.

Conclusion

While these results are promising, they represent the experience of a single individual and should be interpreted with caution.

Larger-scale clinical trials are needed to determine the consistency and generalisability of these findings and to better understand the mechanisms by which concentrated Chiropractic care may influence spinal structure and overall function in patients with osteoporosis.

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Declarations

Patient consent was documented and is held by the lead Author.

All data with appropriate clinical commentary were provided by the lead author.

About the Case Report project

This Case Report is a part of the [ASRF Case Report Project](#), a project designed to gather client studies from Chiropractors and transform them into much-needed case reports, focused on the effects of Chiropractic care on clinical presentations highly relevant to chiropractic, such as stress, immunity and adaptability.

This valuable project is made possible by the generous fundraising and contributions of ASRF supporters. We appreciate you.

ASRF definition of subluxation

'A vertebral subluxation is a diminished state of being, comprising a state of reduced coherence, altered biomechanical function, altered neurological function and altered adaptability.'

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Also by Dr Kotlerman

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