



DIAGNOSIS & DIAGNOSTIC EQUIP

Reverse Digit Span: A Useful Assessment Tool for Patients With and Without Concussion

Charles Masarsky, DC, FICC

Reverse digit span is an easily administered test of attention span. It is a component of the [SCAT3 test](#), which is frequently used to assess concussion.¹ It has been part of the armamentarium of cognitive assessment for [many years](#).² Case evidence suggests the reverse digit span test is a useful tool for assessing patients both with and without concussion symptoms, and tracking their improvement following chiropractic care.

How the Test Is Performed

The examiner speaks a series of digits, asking the patient to repeat them in reverse order. The digits are spoken in a monotone with equal spacing between each, not clumped together like a phone number. For example, the examiner says, "Eight, four, seven," and the patient says, "Seven, four, eight."

The examiner then speaks a series of four digits, then five, etc., increasing the number of digits spoken until the patient fails to repeat them in reverse order. The number of digits in the series prior to the patient's error is their reverse digit span. For example, if they succeed with the above series, but fail with a series of four, their reverse digit span is 3. For an adult with average powers of attention, their reverse digit span should be 5 or greater.

Brief Case Summaries

In the brief case summaries that follow, subluxations were identified by motion palpation and challenge. Applied kinesiology protocols were followed for challenge, manual muscle testing, and all reflex procedures.³ Case #1 did not involve a concussion. Case #2 may have involved a mild concussion due to indirect transmission of mechanical trauma to the head. Case #3 illustrates probable post-concussion chronicity. Case #4 involved a definite concussion in the acute stage. These cases were selected to illustrate the usefulness of this simple test across a wide range of

patient presentations.



Case #1: A 50-year-old male building contractor who attended care for periodic musculoskeletal problems complained of low back pain after playing golf. Subluxations of the right sacroiliac, L3, C7, C1, and left sternoclavicular joint were identified. Manual muscle testing indicated inhibition of the right piriformis and gluteus maximus muscles.

The patient apologized for arriving late to the appointment, explaining he had been distracted that day. Prior to the adjustment, the patient demonstrated a reverse digit span of 3. Following diversified adjustments for the subluxations and neurolymphatic stimulation for the muscle imbalances, the patient reported substantial relief. Post-adjustment, the patient demonstrated a reverse digit span of 6.

Case #2: A 59-year-old full-time homemaker presented for her initial visit with a complaint of neck and right shoulder pain. She stated that her grandson had "jumped on her neck" while she was bent over to pick something up six weeks prior to the visit. She had suffered multiple slip-and-fall injuries over the years, which she claimed caused "no injuries." She had been experiencing a great deal of distraction due to her care of a pair of elderly friends and her elderly parents. She also mentioned she had felt a "drop in concentration" over the previous six years.

Chiropractic examination revealed subluxation at the right SI, T9, T3, and C5. There was also an inhibition of muscle function when gazing to the left (known as "ocular lock" in applied kinesiology). Reverse digit span was 3.

Diversified adjustments were administered for correction of subluxation, and reflex work was utilized for correction of ocular lock. An additional adjustment was administered two days later. Two weeks after the second adjustment, a progress exam indicated improvement in symptoms and subluxation signs. When reverse digit span was retested, her score was 5. Her initial remark regarding the improvement was that her initial reading had been done in the evening, when she

would have been a bit tired. The progress exam took place in the late morning. However, on reflection, she commented, "I do feel like I could focus better."

Case #3: A 41-year-old unemployed man presented with complaints of neck, arm, and low back pain. He is a veteran of U.S. Marine combat operations in Iraq, Kosovo and Somalia. He was directed to our office via the International Chiropractors Association program for returning war veterans (one year of free chiropractic care for returning war veterans).

Sixteen years prior to presentation, he experienced an injury to the coccyx during a parachute accident, with some residual coccydynia. Fifteen years prior to presentation, he was injured by a stun grenade during a training exercise. Although he was not diagnosed with concussion at the time, he experienced visual distortion for several minutes following the injury.

Chiropractic examination including motion palpation and review of X-rays from a previous practitioner revealed cervical, thoracic and upper extremity subluxations. Manual muscle testing revealed inhibition of the left piriformis and right latissimus dorsi muscles. Reverse digit span was 4.

The patient was seen five times over a period of two weeks. Subjective improvement in all presenting symptoms was noted. Reverse digit span was 6 on two-week retest.

Case #4: A 63-year-old executive was seen two days after tripping over an uneven sidewalk while distracted over his son's health problems. He struck the pavement with both arms and his head. Emergency medical X-rays revealed a fractured left radius and right [triquetrum](#). At presentation for chiropractic care, he was experiencing neck pain, back pain and depression. A hematoma was noted inferior to the left orbit. Slight nystagmus and discomfort were noted when he gazed in the left-inferior direction, accompanied by muscle testing results consistent with ocular lock. Reverse digit span was 3.

The patient was instructed to rest both physically and cognitively. Thoracic, glenohumeral, sternoclavicular and sphenoid adjustments were administered on the day of exam and six days later. Reflex work for ocular lock was administered. On progress examination 11 days after presentation, all symptoms were reduced. No nystagmus was noted on any direction of gaze, and no ocular lock was noted. Reverse digit span was 5.

Clinical Takeaway

I cover reverse digit span in both my online and weekend seminars, hoping attendees find it useful in practice for patients with and without concussion. This test also should be considered by chiropractic researchers interested in adding a low-cost outcome measure to their investigational toolbox.

References

1. SCAT3 Sport Concussion Assessment Tool - 3rd Edition. *Br J Sports Med*, 2013;47(5):259.
2. Kipps CM, Hodges JR. Cognitive assessment for clinicians. *J Neurol Neurosurg Psychiatry*, 2005;76(Suppl I): i22-i30.
3. Walther DS. *Applied Kinesiology (Synopsis)*. Pueblo, CO: Systems DC, 1988.

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