Neck Problems, and Pain Referred from the Neck

Pain arising in the neck is common, but often misdiagnosed because the symptoms are felt somewhere else. The pain that arises deep in your spine **is referred**, so that **the brain is given wrong Information about the site of Injury**. **Twisting and crushing forces in the lower neck are the cause**, and **repeated injury, especially during sleep, delays recovery**. Other factors may increase the severity of the pain, such as poor sleep, and loss-of fitness. These ideas can be confusing, so we will explore them in detail.

Referred pain

You can summon up an image of your index finger, because it is richly represented in your brain, and forms part of the "body image", that you are programmed to learn from birth. But deep structures, such as the bones of the spine, are not represented in the conscious brain, and cannot be pictured in your imagination. When pain arises deeply, it must be referred - that is, misrepresented as arising in some other structure that is represented in the "body image".

We often have difficulty believing in referred pain. Back problems are obvious when there is direct pressure on a nerve, and a continuous band of pain spreading from the spine to the hand or foot. But this situation is uncommon. Usually there is no nerve pressure. The pain is often variable in location and quality, and worst, the region of origin may have no symptoms at all.

The concept that the area of origin of the pain can be asymptomatic, and *only* the remote, normal sites symptomatic, is hard to believe, yet examples are seen every day.

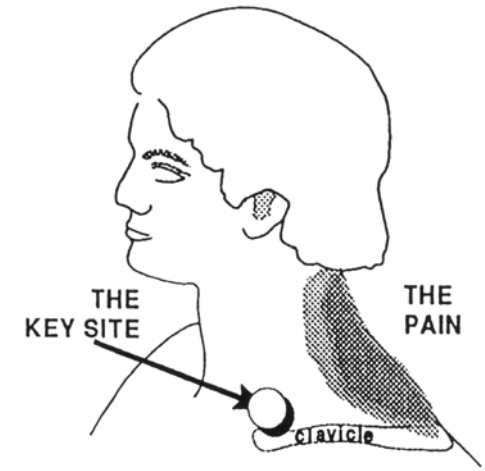

*Figure 1. Referred pain in the cervical syndrome. The **key site**, the area of damage and tenderness deep in the front of the lower neck, from which the pain arises, is almost always free of local symptoms. This site lies just above the inner end of the clavicle (collar bone).*

Figure 1 shows the most common pain described by patients with a neck (cervical) problem - at the side and back. If one suggests that upper body pain has its origin in the neck, patients will accept this possibility.

But if asked *where* in the neck, they will point to the side and back, where they feel the pain. But massage of this area "feels good". It hurts to massage a broken bone, and this characteristic, relief with massage, indicates that the pain is referred from elsewhere. On examination, extreme tenderness, unsuspected by the patient, is found in the vertebral bodies in the front of the lower neck. This is the first reason why we have called this the ***key site***.

The patient may believe that anyone would be tender with this examination. But the tenderness is very real. Because it is unsuspected by the patient, it can be measured objectively, and compared to tenderness elsewhere, and in other individuals.

Frequency and Location of Neck Problems

Low neck problems are very common, as common as low back problems. Symptoms come long before X-ray changes. By the age of 30, 30% of one population studied had had neck/shoulder/arm pain, but in 90% of these, the X-rays showed minimal or no changes [1]. By 50, 50% showed x-ray changes. At 65, 90% showed damage. These changes are concentrated in the lower neck (Figure 2) - exactly where we find the tenderness, but the tenderness appears with the symptoms, decades earlier.

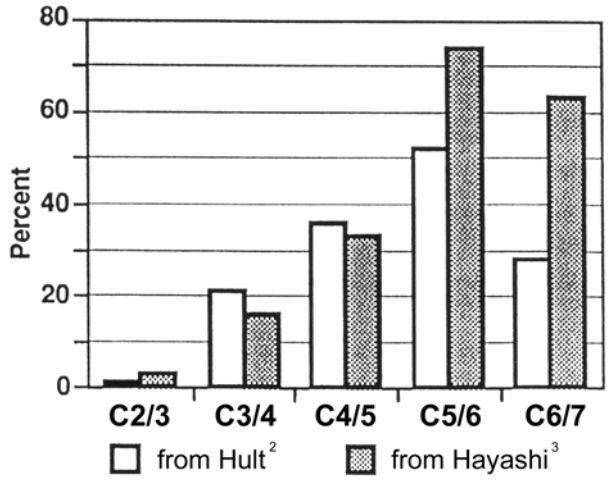

*Figure 2. Distribution of X-ray changes in the neck; data from Sweden [2] and Japan [3]. For mechanical reasons, the damage is concentrated in the **lower** neck. This is another reason we call this the **key site**.*

Referred Tenderness

The pain originates in the low neck, but is misinterpreted by the brain as arising in many, widely different sites. Reflex responses to pain are also determined by the nervous system, among which is the development of characteristic sites of **referred deep tenderness**. While the pain can vary, the tender points are **precisely predictable in location**. They are generally unknown to the patient, because they lie deep, often in areas that are free of symptoms. Pressure on these sites, or the pull of muscles during use, may produce further referred symptoms. The multiplicity of points is important. If only one is found, a diagnosis such as “tennis elbow”, “bursitis", or “tendonitis” is reasonable, and perhaps due to local repeated injury. However, when examination reveals many very tender points (as in Figure 3), not in areas of strain or pain, the repetitive strain injury theory becomes unreasonable, or at least, incomplete.

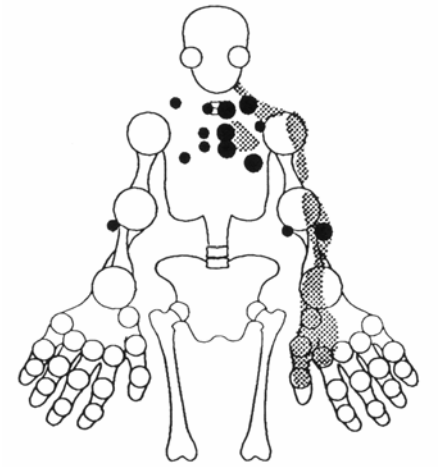

Figure 3. Distribution of pain (grey) and tender points (black) associated with chronic neck strain. The location and quality of the pain are variable, but the location of the tenderness is different, constant and predictable. Control sites are found, which remain nontender even in areas which have been painful.

Pain Equivalents

When the discomfort is referred to the forearm or hand, it often changes character. The distress that is felt as an aching in the shoulder region, may feel like a **burning** or a **swelling** elsewhere, and **numbness** or tingling in the hand. These sensations may suggest pressure on a nerve. This can be checked by a simple test. When the numbness is present, rub the fingers over a piece of clothing. If the patient can tell the difference between cloth and paper, major nerve damage is extremely unlikely.

Headache behind and above the eyes, and jaw joint pain, are common, and may be misdiagnosed as "tension headaches", migraine, or sinusitis. Dizziness, an **unsteadiness** rather than a spinning feeling, is common in patients with neck problems. For hand-eye coordination, we need communication between shoulder, arm and neck muscles, the organs of balance, and eye muscles. They are all closely linked neurologically.

The Biomechanics of Cervical Strain

Understanding of the location and nature of the forces acting on the lower neck is essential because the cause determines the treatment. The concentration of damage in the lower neck and the lower back are uniquely human problems. We are highly vulnerable in these two sites, and other species are not, and this is related to our uniquely human anatomy. What is special about the human neck? Nothing. The problem is our human shoulder, propped high and to the side, by our long collar bone, and broad, flat rib cage. We can swing our arms through 360° - dogs and horses can't. We can climb, swim, and throw. We don't breathe better than a dog or horse, but our flat broad rib cage holds the shoulder high. Even more importantly, we have a long strong collar bone or clavicle, acting as a strut.

Four-footed mammals do not have a clavicle. It appeared in evolution first in monkeys, as they adapted for climbing. Only humans have the flattened chest cage and long clavicle that permits our great versatility of totally free upper limb function (Figure 4).

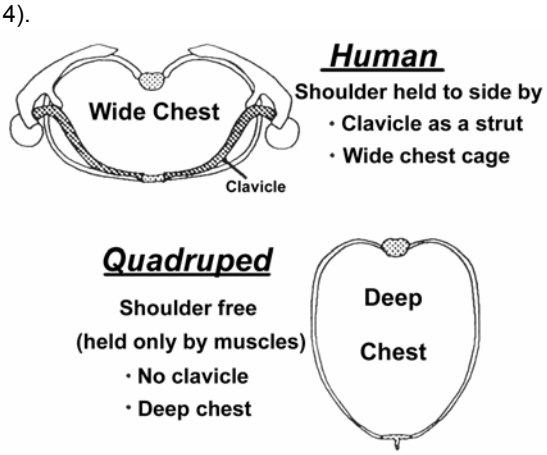

Figure 4. Evolutionary changes in the shape of the rib cage, and the development of the clavicle which strut the human shoulder high and to the side.

During the day we can do all sorts of things that other animals cannot. But there is one drawback. We cannot *sleep* on our stomach or side without stressing our neck. Imagine the very marked twisting and crushing forces in your shoulder if someone put your hand behind your back, and pulled up and out. This is what happens in your lower neck during sleep.

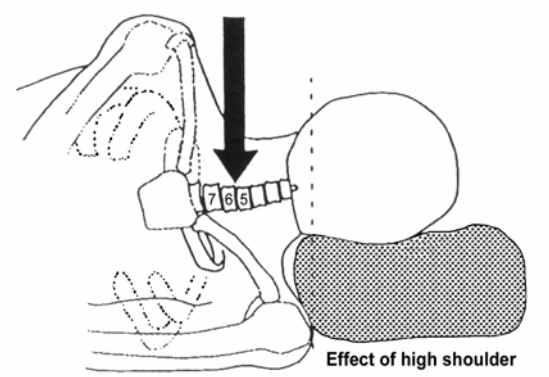

Figure 5. Problems in the lower neck during sleep. The ribs, and bones of the shoulders support the chest part of the spine. The bones of the lower neck are unsupported, and sag until ligaments tighten, then they lock and twist.

Figure 5 shows how difficult it is to support the ***key site*** in the lower neck because of the high lower shoulder. When we lie on our side, we change our shape to adapt to the flat surface of the bed by allowing the lower shoulder to rise upwards to the level of the chin or higher. Instinct tells us to pull our pillow under our neck, but the shoulder blocks the support at the jaw level.

Reliable Neck Support

We have discussed the problems; they indicate that the solution is to deliver reliable support to the sagging bones in the lower neck. A simple and inexpensive solution is to use a soft collar, or better, two rolls (ruffs) of tubular cotton about 75 cm (30 inches) long, stuffed with soft synthetic quilting material to a diameter of 6 cm (2.4 in), leaving tails long enough to tie both ends snugly in front.

These ruffs have been in common use for decades, and may work well if sized and used correctly. They stay in place despite movement during sleep. They often fail to support the lowest levels, and so fail to give complete relief. They can be hot, sweaty, and uncomfortable, so they are removed and then they don't work any more. To prevent recurrence, neck support must be continued indefinitely.

Effective treatment requires reliable support for the lower neck all night every night. This can only be learned intellectually, because the ***key* site** will remain unfelt, and the brain will continue to receive messages that the problems lie elsewhere. The therapist must make the correct diagnosis and give the correct advice clearly, as it is necessary for the patient to persist with effective support to prevent recurrences.

To support the tender, vulnerable site in the front of the low neck, the neck support ridge and the neck must both be angled forward, but with the chin high and free from pressure. Because the patient is unaware of the ***key site,*** they must be carefully instructed. **If you can get a finger between the neck support ridge and the inner collar bone, the support is not being delivered low enough!** (Figure 6).

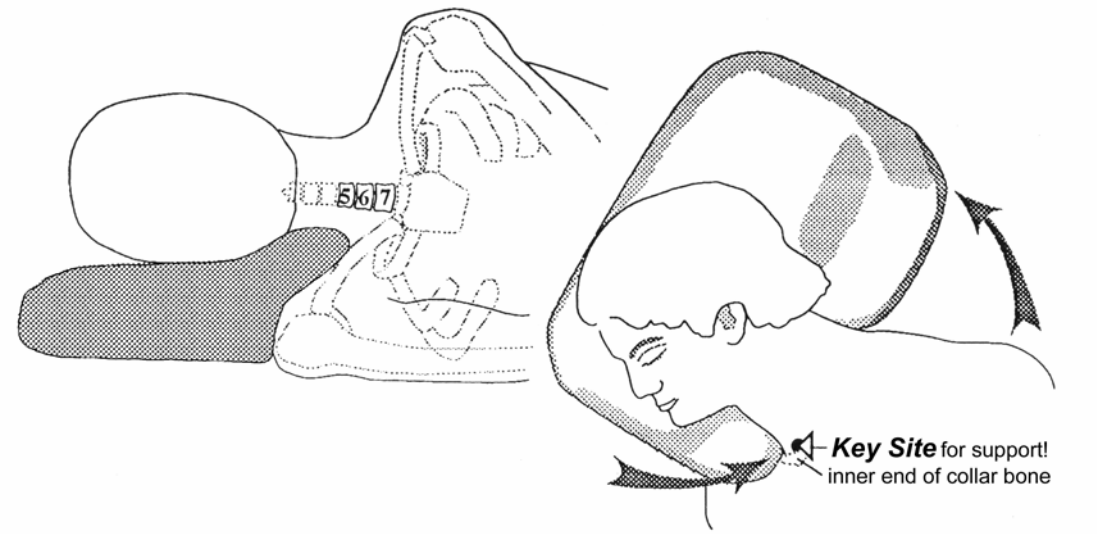

Figure 6. ***Correct use of neck support pillow.*** *It is hard to deliver support to the 6th and 7th levels, very low in the neck. The neck support ridge must slope quite steeply, under the ear in back, and low against the inner collar bone in front. The neck is angled forward, with the chin above the neck support ridge.*

It seems natural for the patient to place the pillow with the neck support ridge straight across, or nearly so, as in Figure 7. The gap between the support ridge and the inner collar bone means that support is not reaching the lower neck, and there may be upward pressure on the chin.

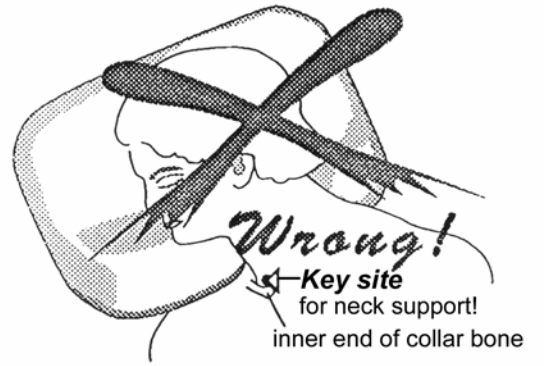

Figure 7. ***Wrong use of neck support pillow!*** *There is a gap between the neck support ridge and the inner end of the collarbone, big enough that 2 fingers can be inserted. The* ***key site*** *in the lower neck is not being supported. Both the neck and the support must be angled more steeply forward, as in Figure 6.*

The C6-7 Syndrome

Some patients find neck support strategies comfortable, so use them faithfully, but continue to have upper body symptoms. The pattern may be changed, with a lower distribution of pain, about or between the shoulder blades in the back, or beside or below the breast area in front. if there is numbness in the hand, it is more likely to affect the long, ring and little fingers, and less likely to affect the thumb and index finger. But symptoms remain, so the treatment result is disappointing.

The therapist may be puzzled too, because the previous tenderness at the 5-6 level will have disappeared, and referred tenderness in the shoulder muscles, upper ribs, and outer elbow, will also have gone. Further examination will show a new pattern of tender sites - none on the medically standard list of sites to be examined in patients with chronic pain syndromes. The inner elbow will be much more tender than the outer elbow, and marked tenderness may be found at the site of the heart beat, or behind the outer breast (among other sites). The mystery is solved by the finding of very marked tenderness even lower in the neck, at the C6-7 level. This level is not being adequately supported. Two fingers can be inserted between the neck support ridge and the collar bone. The solution is to make sure that the very lowest levels get the needed support, by curling the head forward and angling the neck support ridge as shown in the right drawing in Figure 6.

Sleep Mechanics in General

Humans have broad shoulders, a narrow waist, and broad hips. Our beds are flat. This mismatch in shape gives too much pressure on our bony prominences, with inadequate support under our middle, as well as under the neck. Water beds accommodate the bones, but sag under our middle. A cushion under the waist and lower ribs may simultaneously ease pressure on the lower neck, shoulder and hips, and prevent midspinal sag. More sophisticated solutions may appear, but a firmly supported mattress with a soft mattress cover dimpled like an egg-crate, and yet another pillow between the knees may do nicely.

Most of this discussion assumes that you sleep on your side, as do most adults. The young and flexible often sleep tummy down, a position which assists unobstructed breathing. Of course their head must be turned to the side, adding to the torque forces in the low neck. The pillow under the waist can be helpful in easing stresses in both neck and low back.

If your neck is sore or stiff, then you must sleep on your back; this is why snoring is associated with age. Support under the lower neck, and a pillow under the knees ease the spine, though restful sleep comes harder to most.

Vicious Cycles

If the neck is stressed during sleep, giving pain, then sleep may be nonrestorative, so that the patient wakes aching and tired. If they are aching and tired, then they may not wish or be able to do fitness activities, and rapidly become physically unfit. Nonrestorative sleep and physical deconditioning increase sensitivity to pain, and decrease energy.

A complete treatment program will begin by correcting the mechanical problem in the neck (and low back, if involved), but must be completed by a properly graded but persistent program to return to a high level of physical fitness. Only then will there be a return of energy, better sleep, and a higher tolerance to pain.

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