# Clinical case: Cervical biomechanical assessment

26 year-old woman.

Profession: Administration

Dominance: Right-handed

Personal antecedents: No prior antecedents of interest for the procedure.

Patient of 26 years of age with a record of post-traumatic cervicalgia following a traffic accident due to a crash on 23/7/16.

## Clinical record and progression

Traffic accident due to a rear-sided crash. At first, an assessment is requested in the Emergency Service, showing post-traumatic cervicalgia and dizziness. After the the relevant assessment and discarding pathological findings in the image tests (antero-posterior and lateral cervical X-ray), she is discharged for treatment at home with oral analgesic and local heat.

After one month with this clinical picture, the symptoms persist so she is referred to the Rehabilitation Service, where she is prescribed physiotherapeutic treatment, but she reports that the pain persists.

She currently reports cervical pain in the cervical paravertebral and bilateral occipital regions. Mechanical-type pain. No radicular component.

The patient describes interference from the symptoms on driving or activities that involve sudden, fast cephalic movements in general, as well as a lack of concentration in habitual activities. She is currently not undergoing regular analgesic treatment, only Ibuprofen or Paracetamol on demand if she has cephalea.

## Physical examination

The physical examination objectively confirms: no anti-algic attitudes or relevant asymmetries. Free articular balance of the cervical spine except for minimal limitation in the last degrees of active extension due to pain. The patient reports pain in the right paravertebral cervical musculature on rotation to the left. Painful palpation in spinous C3 to C7. Bilateral cervical pain in the places described. Pain in upper fibres of both trapezius, with no contraction. Negative in stretching and root compression manouevres.

## Assessment method

Due to the persistence of painful symptoms and limitation of movement, a request is made for a **functional assessment of the cervical spine** by applying **NedCervical/IBV, which uses photogrammetry apparatus and compares the results with a database of normal cases**.

# 1. RESULTS

## Limit test

*In this test, an active cyclic motion of maximum range is requested in each of the three axes of movement.*

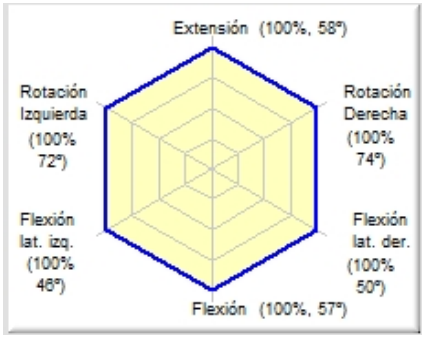


*Figure 1: Visual hexagon of the range of motion observed together with its percentage of normality. The range of motion in degrees and the percentage of normality corresponding to that range can be seen in a comparison with the IBV's normality databases.*

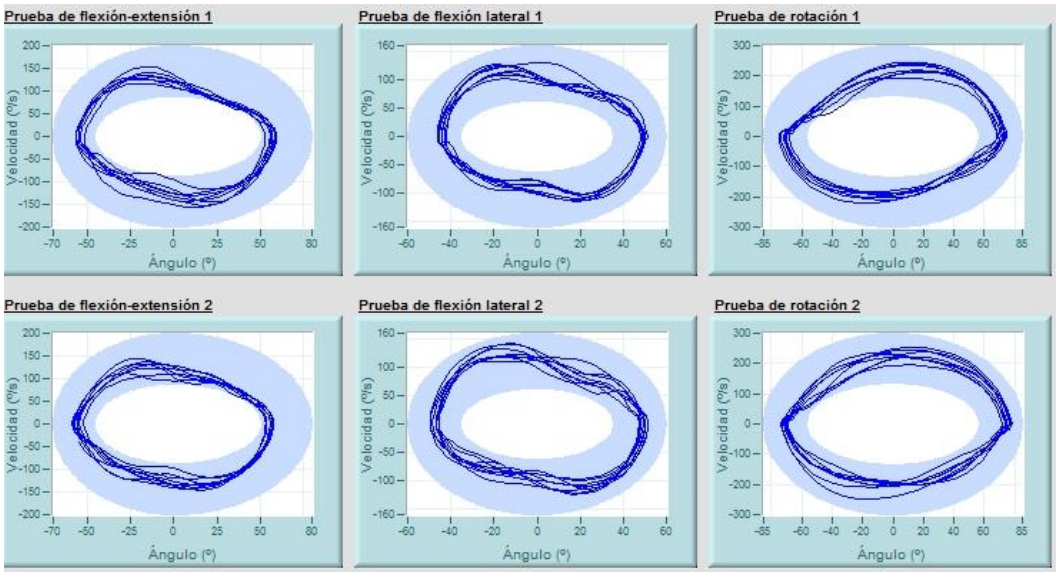


*Figure 2: Phasor graphs (representing angular velocity with respect to the angle of motion) for the two recordings of each of the motions. The blue zone represents the area of normality, whereas the pink zone represents the altered zone.*

| | Rango | Vel. máx. | Acel. máx. | Armonía | Rep. intraprueba |
|---|---|---|---|---|---|
| Flex.-ext. 1 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Flex.-ext. 2 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Flex. lat. 1 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Flex. lat. 2 | 100.0 | 100.0 | 100.0 | 100.0 | 88.1 |
| Rotación 1 | 100.0 | 100.0 | 100.0 | 98.1 | 100.0 |
| Rotación 2 | 100.0 | 100.0 | 100.0 | 100.0 | 90.1 |

***Table 1:*** *Results in percentages of normality from each of the tests. Values below 90% in the normality index are considered not normal or functionally altered.*

## Functional test

*In this test, a functional movement is requested involving looking at a light (to the right, above and left) in each repetition and then noting down the value that appears in a notebook. The ranges are not maximums and motions are combined.*


*Figure 3: Graphs of the mobility of the cervical spine when the patient stares at a light to their left (light 1), above them (light 2) and to their right (light 3).*

| | Rango | | Velocidad máxima | | Aceleración máxima | | |
|---|---|---|---|---|---|---|---|
| | Flex.-ext. | Rotación | Flex.-ext | Rotación | Flex.-ext. | Rotación | Valoración |
| Prueba 1 (izq.) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Prueba 2 (central) | 100.0 | - | 100.0 | - | 100.0 | - | 100.0 |
| Prueba 3 (der.) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Table 2: Results in percentages of normality from each of the functional tests. Values below 90% in the normality index are considered not normal or functionally altered.*

## Final assessment


*Table 6: Final overall result for functionality of the cervical spine. Values below 90% in the normality index are considered not normal or functionally altered.*