

# The Digni Quinti Sign, Souques' Interosseous Phenomenon, and Pronator Drift Test as Subtle Motor Signs in Patients with Monohemispheric Brain Tumor

*O Sinal do Quinto Dedo, o Fenômeno dos Interósseos de Souques e o Teste do Desvio Pronador como Sinais Motores Sutis em Pacientes com Tumor Cerebral Monoemisférico*

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## **Abstract**

This was a prospective blinded study on the sensitivity and specificity of the digiti quinti sign, Souques' interosseous phenomenon, and pronator drift test as subtle motor signs in patients with monohemispheric brain tumor. Of 71 patients, 57 had radiological confirmation of cerebral lesions, and 14 individuals had normal cerebral imaging. The digiti quinti sign and Souques' interosseous phenomenon showed the same sensitivity (31.5%). The pronator drift test showed the lowest sensitivity (12.2%). The combination of the three tests was positive in 49.1% of the patients.

**Key words:** Brain neoplasms; Pyramidal tracts; Muscle weakness; Physical therapy (Specialty)

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## INTRODUCTION

Examination for motor deficits has been a constant in the history of neuroscience. According to the Edwin Smith Egyptian surgical papyrus (c 1600 BC copy of c 3000 BC manuscript), patients were instructed to move the face, arms, legs, and head in several directions, probably to detect the location of motor deficits<sup>1</sup>.

One of the physical therapist's main roles is to identify functional deficits, or paresis<sup>2</sup>. However, routine neurological examination shows low sensitivity for detecting early cerebral hemispheric lesions in patients without obvious focal signs<sup>3</sup>. Detecting subtle motor deficits, defined as a minimal reduction in strength not perceived by the patient's family and coworkers but manifesting as a subtle difficulty in routine activities<sup>4</sup>, is a major goal of the therapist, spares time, and may have direct implications for the outcome.

Our aim in this study was to determine the sensitivity and specificity of three semiotic maneuvers, called *digitus quinti sign* (DQS), Souques' interosseous phenomenon (SIP), and pronator drift test (PDT), for the detection of subtle motor arm weakness in patients with monohemispheric brain tumor.

## PATIENTS AND METHODS

Seventy-one outpatients seen at the Neurosurgery Department of the National Cancer Institute (INCA) in Rio de Janeiro, Brazil, were enrolled in the study. Among the 57 patients with unilateral brain disease (30 women, or 51.8%), mean age ( $\pm$ SD) was 45.6 ( $\pm$ 13.7) years. All patients' symptoms had lasted longer than one month. Table 1 describes the histological diagnoses and location of the lesions. Fourteen patients, mean age 54.7 ( $\pm$ 14.2) years,

referred for investigation of headache, seizures, or dizziness, but without cerebral lesions, were enrolled as controls.

Patients and controls underwent complete neurological examination and were submitted to cerebral magnetic resonance imaging (MRI) reviewed by the neurologists. They were then blindly evaluated (no access to neurological data, clinical data, or imaging results) by one of the examiners (M.E.T.) with the mini mental status examination (MMSE) and specifically screened for several motor signs<sup>5</sup>, including DQS, SIP, and PDT.

In the DQS<sup>6</sup> examination, the patient stands directly in front of the examiner and extends both arms with palms down. The sign is present when the fifth finger abducts from the others.

The SIP<sup>7</sup> is present when the fingers' extension and abduction occurs on the affected side when the extremity is raised to a position above 90° of shoulder flexion or abduction.

In the PDT<sup>8</sup>, the patient holds the upper extremities outstretched in front, the elbows and wrists are extended with palms up, and the position of each extremity is observed. The patient must maintain in this position for at least 20-30 seconds. To rule out visual compensation, patients performed all three tests with eyes closed.

Patients were excluded if they had an obvious hemiparesis, aphasia, weakness resulting from peripheral nerve alterations, brainstem, cerebellar, or bilateral cerebral lesions, movement disorders, non-neurological disorders that hindered neurological assessment, a marked midline shift associated with a focal brain lesion, or if drowsiness or cognitive impairment (MMSE < 25 points) affected their cooperation with the neurological examination.

The study was approved by the Institutional Review Board of the National Cancer Institute, Rio de Janeiro, and all patients signed the informed consent form.

Table 1. Histological Diagnosis and Location of Brain Lesions

Histological Diagnosis	Lobes			
	Frontal	Temporal	Parietal	Occipital
Pilocytic astrocytoma	7	1	0	0
Anaplastic astrocytoma	4	6	1	0
Glioblastoma multiforme	1	1	3	0
Oligoastrocytoma	1	1	2	0
Meningioma	6	4	5	0
Metastasis	0	0	3	0
Ependymoma	0	2	0	0
Hemangioma	0	1	0	0
Neurocytoma	0	0	1	0
Ganglioglioma	0	1	0	0
Undetermined	1	3	2	0

## RESULTS

Of 57 patients with monohemispheric cerebral lesions, DQS was present in 30 (52.6%); thirteen (22.8%) on the right side and seventeen (29.8%) on the left. In 18 patients (60%), the sign was contralateral to the cerebral lesions, and it was positive in 8/14 (57.2%) controls.

SIP was present in 14 patients (24.6%); nine (15.8%) on the right side and five (8.8%) on the left. In seven patients (50%), the sign was positive contralateral to the lesions, and it was positive in five (35.7%) of 14 controls.

Of 30 patients with positive DQS, 13 (43.3%) also showed positive SIP. In 12, both signs were on the same side. Only seven patients (12.2%) presented both signs contralateral to the cerebral lesion. One patient showed SIP without DQS.

PDT was positive in 25 patients (43.8%) with cerebral lesions; 14 (24.5%) on the right and 11 (19.2%) on the left. In 18 patients (31.5%), the sign was contralateral to the cerebral lesion, and it was positive in only one control (7.1%).

All three maneuvers (DQS, SIP, and PDT) were positive and contralateral to the brain lesion in two cases (3.5%), but the combination of the three tests was positive in 28 of 57 patients (49.1%).

Table 2 shows the signs' sensitivity and specificity. Since the signs ipsilateral to the lesion were false localizers in the analysis of sensitivity and specificity, we considered only those contralateral to the lesion.

## DISCUSSION

In 1973, Milton Alter described the DQS<sup>6</sup> as a subtle sign of mild upper limb paresis, arguing that this sign was secondary to involvement of discrete fibers from the pyramidal tract subserving the quinti digiti. The author asked whether this sign was a mild form or a fragment of the *phénomène des interosseux* described more than a half century before by the French neurologist Souques<sup>7</sup>. In our study, DQS was more sensitive than SIP, and apparently DQS is not a fragment of SIP, since fewer than 50% of patients with DQS showed SIP.

In subtle cortical spinal tract (CST) lesions, the extensors, supinators, and abductors in the upper extremities are disproportionately affected, and are overcome by the uninvolved and therefore stronger muscles: pronators, biceps, and internal rotators of the shoulder<sup>8</sup>. Since they overcome the slightly weakened CST-innervated muscle, the hand pronates, the elbow flexes, and the arm drifts downward. Based on this premise, according to authors, if only one motor test can be done on a patient with subtle motor deficit, the best single option is the pronator drift test<sup>8</sup>. Sawyer *et al.*<sup>9</sup> registered drift of an upper extremity in 49 (79.0%) of 62 patients with contralateral acute or chronic brain lesions. Weaver *et al.*<sup>4</sup> prospectively evaluated 50 consecutive patients with mild unilateral arm weakness. Thirty-eight (76%) had a positive pronator drift within 30 seconds. Eight patients had no pronator drift, but did demonstrate finger spreading, and four (8.0%) showed only abduction of the little finger. Meanwhile, in a sample of 46 patients with monohemispheric cerebral lesion, Anderson *et al.*<sup>3</sup> found that pronator drift was present in only 10 patients (22%); four of these had normal upper limb strength.

Importantly, care must be taken to avoid false positive signs caused by CST lesions: cerebellar disease can cause some degree of arm drift with movement outward and usually slightly upward<sup>8</sup>. In parietal lobe lesions, there may be "up drift", with the involved arm rising overhead without the patient's awareness, ostensibly due to loss of sense of position<sup>4,8</sup> and in ulnar nerve injury, abduction of the little finger can occur<sup>4</sup>.

In our sample, PDT was the most specific of the three tests in patients with subtle motor deficit and monohemispheric brain tumors. DQS and PDT were equally sensitive, but DQS was less specific than SIP and PDT. The combination of DQS, SIP, and/or PDT was present in 49.1% of patients, similar to the findings by Anderson *et al.* (50%), using a combination of four tests (pronator drift plus three more tests) to detect focal cerebral hemispheric lesion<sup>3</sup>.

The relatively low sensitivity of these three neurological tests for detecting subtle motor deficit may

Table 2. Sensitivity and specificity of DQS, SIP, and PDT

	Lp/t+	Lp/t-	La/t+	La/t-	Sensitivity	Specificity
DQS	18	39	8	6	31.5%	42.8%
SIP	7	50	5	9	12.2%	64.2%
PDT	18	39	1	13	31.5%	92.8%

DQS: Digiti quinti sign; SIP: Souques' interosseous phenomenon; PDT: Pronator drift test; Lp/t+: lesion present / test positive; Lp/t-: lesion present / test negative; La/t+: lesion absent / test positive; La/t-: lesion absent / test negative

be explained by the high specificity of patient selection with monohemispheric brain tumor; symptoms lasting over a month, and - most importantly - no obvious neurological motor complaints. However, we believe that these extremely easy, quick, and non-invasive maneuvers should be a routine part of physical therapy and neurological examination.

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**Declaração de conflito de interesse: nada a declarar.**

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#### Resumo

Realizou-se um estudo prospectivo cego sobre a sensibilidade e especificidade do sinal do quinto dedo, do fenômeno dos interosseos de Souques e o teste do desvio pronador como sinais motores sutis em pacientes com tumor cerebral monoemisférico. De 71 pacientes, 57 possuíam lesão cerebral comprovada radiologicamente e 14 indivíduos apresentavam imagem cerebral normal. Tanto o sinal do quinto dedo como o fenômeno dos interosseos de Souques evidenciaram a mesma sensibilidade (31,5%). O teste do desvio pronador apresentou baixa sensibilidade (12,2%). A combinação dos três testes foi positiva em 49,1% dos pacientes.

**Palavras-chave:** Neoplasias encefálicas; Tratos piramidais; Debilidade muscular; Fisioterapia (Especialidade)