



Review Article

Review/perspective on hysterical paralysis: A diagnosis of exclusion for spinal surgeons

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ABSTRACT

Background: Hysterical paralysis (HP) and/or conversion disorders (CD) are diagnoses of exclusion for spine surgeons. Before assigning this diagnosis to a patient, they must first undergo a full neurodiagnostic evaluation (i.e., X-rays, MR, CT/Myelo-CT) to rule out organic spinal pathology. Here, we reviewed select articles highlighting how to differentiate HP/CD patients from those with spinal disease.

Methods: Several case studies and small series of patients with HP/CD were included in our analysis. Notably, prior to being assigned the diagnoses of HP/CD, patients had to first undergo X-ray, MR, CT, and/or Myelo-CT evaluations to rule out spinal disorders; typically, their neurodiagnostic studies were normal.

Results: Patients with HP/CD often presented with varying clinical complaints of motor paralysis despite intact reflexes, normal sensory examinations, and lack of sphincter disturbance (i.e. intact rectal tone). Further, go and nogo functional MRI (fMRI) examinations demonstrated inconsistencies in areas of brain activation for patients with HP/CD complaints.

Conclusions: HP/CD are diagnoses of exclusion, and patients should first undergo a full panel of neurodiagnostic studies to rule out organic spinal disease. While those with HP/CD should not have unnecessary operations, those with real “surgical pathology” should have appropriate spine surgery performed in a timely fashion.

Keywords: Computed Tomography (CT), Conversion Disorder (CD), Diagnosis of Exclusion, Functional MRI (fMRI), Hysterical Paralysis, Magnetic Resonance Imaging (MR/MRI)

INTRODUCTION

Hysterical paralysis (HP) or conversion disorders (CF) are diagnoses of exclusion [Table 1].^[1-17] Therefore, before assigning patients the diagnosis of HP/CD, spine surgeons must first complete full evaluations (i.e., X-rays, MR, CT, Myelo-CT studies) to rule out organic spinal disease that may warrant surgical intervention. Further, if and when fMRI is available, these studies may further supplement and differentiate between organic spinal pathology and HP/CD.^[4,10,16]

MULTIPLE FACTORS ASSOCIATED WITH HYSTERICAL PARALYSIS/ CONVERSION DISORDERS

Maxion *et al.* (1989) identified multiple factors in patients with “classical conversion syndromes” and/or psychogenic seizures/paralysis [Table 1].^[11] Out of 172 patients, 55% had

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Table 1: Review/perspective of hysterical paralysis/conversion disorders.

Gould <i>et al.</i> ^[6] 1986 J Nerv Ment Dis	Validity Hysteria 30 Consec Neurology Admits Acute Brain Lesions	7 Features Hysteria Hypo-chondria Secondary Gain BI, Nonanat Sensory Loss, Pain/Vib Split Midline	7 Features Hysteria Cont Changing Hypalgesia Give way Weak 30 had 1 Feature Most 3-4	Hysteria Findings with Acute Brain Lesions Invalidates 7 Features as Typical for Hysteria	Movement Paralysis Often Misabeled as Hysteria Caution Diagnose Hysteria-Often Incorrect
Maxion <i>et al.</i> ^[11] 1989 Psychother Psychosom Med Psychol	HP Syndromes Not Rare Younger Patients	172 55%-Fits Psychogenic 45% HP 2/3 F 25% GI Surgery	Symptoms Ages 15-25 or 45-55 50% Unskilled Workers 12% Perinatal Brain Damage	80% Severe Conflicts Men-Professional Problems Females - Relationship Problems	Long-Lasting Syndrome More in Females PP
Apple ^[1] 1989 Paraplegia	HP-Spinal 17 Patients	Variety Patterns Motor- Sensory Loss	15 of 17 Normal DTR All Sphincter Control Intact	16 of 17 Improved After Avg 3.8 Day Hospital Stay 13 Fully Recovered	HP Spine Normal DTR Normal Sph Routine X-rays Not Organic Concluded
Marshall <i>et al.</i> ^[10] 1997 Cognition	Functional Anatomy HP/CD Use fMRI Test Motor Paralysis Case	HP -Feigned? - Failure to Find Organic Cause	Case: Female Left Leg Paralysis + Sensory Loss No Organic Lesion- Psychological Trauma	fMRI Left Leg Paralyzed Go- Nogo Test Not Activate Right Primary Motor Cortex-Right Activated Orbito-Frontal- Anterior Cingulate Cortex	These 2 Areas Inhibit Prefrontal Effects on Right Primary Motor Cortex
Letonoff <i>et al.</i> ^[9] 2002 Spine	HP 3 F LE Paralysis Prevalence 5-22 per 100,000 Typically Female No Education	Diagnosis Exclusion. Not Organic 2 Trauma 1 Prior HystS	Normal: Labs, Electrical, Imaging Studies Spontaneous Return Function 6 mos	Inconsistent Exams Loss Motor Sensory Function-Normal DTR- Claim Incontinence But Normal Rectal Tone	Typically Walked Out of Hospital Told Exams Normal
Vuilleumier ^[16] 2005 Prog Brain Res	Hysterical CD-No Organic Lesion Use fMRI	Psychogenic Stress- Emotional-Conflicts Use fMRI, EEG, PET or SPECT	fMRI See Increased Activation of cingulate or Orbitofrontal Regions During CD Symptoms	fMRI <Activity Frontal/ Subcortical Motor Control with HP-< Somatosensory Cortex HP < Visual Cortex Hysterical Blindness	Better Know NeuroPsych Bases Hysterical CD Improve Clinical Management
Okun and Koehler ^[13] 2007 Mov Disord	Astasia and Abasia= Inability to stand and walk CD	Despite Normal Leg Function in Bed	Blocq 19 th Century Neurologists	Paralysis Jump fits Tremor Bizarre behavior= Identification	CD Differentiated from Hysteria
Cojan <i>et al.</i> ^[4] 2009 Neuroimage	Motor Inhibition HP Go-NoGo fMRI Conversion CD	Study Mechanism Inhibition Motor Brain Pathways by Emotional Status	Failure to Move Due to Activation Percuneus Ventrolateral Frontal Gyrus Cingulate Cortex, VMPFc	Inhibitory Mechanisms in Simulation and Conversion Paralysis	Conversion Circuits Not Usual Inhibition Circuits— Activation Midline Brain-Emotional Regulation
Hsieh <i>et al.</i> ^[7] 2010 Spine	CD Paral After LDH 37 yo F Left Lam L5S1-LDH	Normal Till 1 hr Postop-LLE Weak Surgical Reexplore No Clot No Lesion	Motor Fx Recovered Postop Until Recurrent Paralysis 10 hrs later	Reexplore Negative Normal SEP/ MEP+Imaging	Normal SEP and MEP Help Confirm CD with Normal Motor/Sensory Function

(Contd...)

Table 1: (Continued).

Stone <i>et al.</i> ^[15] 2012 J Neurol Neurosurg Psychiatry	Autobio-graphy Functional Paralysis Book "A Leg To Stand On"	Recovery Fall Norway 1982 Leg Injury Surgery Reattach Quad	Emotional Period Leg Not Part of Body-Hard to Regain Walking	First Rejected Hysterical Paralysis Later Reconsidered	Recognize Functional Psychogenic Paralysis Post Injury Rapid Recovery Expected from HP
Zhu <i>et al.</i> ^[17] 2012 Rheumatol int	HP After Spine Surgery 2 Cases 2 M	Nonanatomic Deficits	Ortho Surgeon Should Learn to Recognize HP Avoid Unneeded Surgery	Aware Nonanatomic Functional Deficits	
Nguyen <i>et al.</i> ^[12] 2013 Int J Obstet Anesth	Recurrent PP in 29 yo F After Dural Puncture Elective Delivery	Symptoms LE Weakness and Sensory Loss ASx Chiari I M	Spinal Anes Followed by GA (Convert to Open C Section)	Extubated -Bilateral LE Weakness 4-6 h later-MR Normal Dx HP/CD Prior Episode After Dural Puncture (i.e. at 27 Weeks Gestation similar event)	HP After Dural Puncture Rate
De Bustos <i>et al.</i> ^[5] 2014 Font Neurol Neurosci	Clinical HP/CD Hotly Debated 2000 years	Typically F Sexual Disorders Other Diagnoses Neuroses. Parkinson's, Seizures	3 Classes HP- Acute Attacks- Paroxysms Functional Syndromes, Visceral events.	Minor HP-Syncope- Tetany, Twilight States, Paroxysmal Amnesia, Cataleptic Attacks.	Minor HP- Focal Hysterias, Paralysis, Contractures - Spasms, Anes Sensory Abnormality Psychiatric Diagnosis 9 Neurosis 2 Psychosomatic Dis-Conservative Rx-Excellent 7 Good 4 Outcomes
Kanchiku <i>et al.</i> ^[8] 2017 Clin Spine Surg	HP in 11 Adolescent	3 M, 8 F Avg Age 16.5 (13-19 yo) Followed Avg 4.67 years (1-10.25)	All Nonorganic Signs	Used MEP Assess Primary Muscle Weakness (Exclude Organic Disease)	9 Neurosis 2 Psychosomatic Dis-Conservative Rx-Excellent 7 Good 4 Outcomes
Blashfield ^[2] 2019 J Nerv Ment Dis	16 Class Systems Before WWI	<15% Correlation Over 7 Different American Classes	16 Classes: Mania Acute Mania Chronic Maina Melancolia Paralysis Senile Dementia	16 Classes: General Epileptic Insanity Hysterical Insanity Moral Insanity Idiocy Cretinism	11 Names 19 th Century Views Mental Disorders
Osman <i>et al.</i> ^[14] 2020 Epilepsy Behav	FND Sudan 40 of 1000 Neuro- psych CD Clinic	Dx Exclusion Neuro Eval Depression BDI, HAD	60% Young F Unemp 82.5% HystS	47.5% Speech Abnl 35% week/Paral 97.5% MD	95% Marked Clinical Response Combined Anti-Dep PsychoTh

HP: Hysterical Paralysis, Lit: Literature, Rev: Review, Conversion Disorder: CD, Org: Organic, Fx: Function, Ppt: Precipitated, TR: Trauma, Prev: Prevalence, F: Females, M: Males, LE : Lower Extremity, HystS: Hysterical Seizure, DTR: Deep Tendon Reflexes, Sph: Sphincter Function, Inc: Incontinence Bowel/Bladder, Spont: Spontaneous, Pt: Patient, Educ: Education, Lim: Limited, SocBack: Socioeconomic Background, mos: Months, FND: Functional Neurological Disorder, Neuropsych: Neuropsychological, Neuro: Neurological, Eval: Evaluation, Dis: Disease, BDI: Beck Depression Inventory, HAD: Hospital Anxiety and Depression Scales, Abnl: Abnormalities, Weak: Weakness, Paral: Paralysis, Anti-Dep: Anti-Depressants, PsychoTh: Psychotherapy, Dx: Diagnosis, MD: Mood Disorder, Unemp: Unemployed, LDH: Lumbar Disc Herniation, Surg: Surgery, Lam: Laminotomy, Postop: Postoperatively, hrs: Hours, Electro: Electrodiagnostic. MEP: Motor Evoked Potentials, SEP: Somatosensory Evoked Potentials, CNS: Central Nervous System, SS: Signs/Symptoms, BI: Belle Indifference Vib: Vibration, Nonanat: Nonanatomical, Consec: Consecutive, Avg: Average, yo-Years Old ,Psycho: Psychogenic , Rx: Therapy, Ortho: Orthopedic, PP: Psychogenic Paralysis, ASx: Asymptomatic, Chiari I M: Chiari I Malformation, Anes: Anesthesia, GA: General Anesthesia, GI Surgery: Gastric/Duodenal Ulcers, CNS: Central Nervous System, MRI: Magnetic Resonance Images, fMRI: Functional MRI, PET: Positron Emission Tomography Scan, SPECT: Single-Photon Emission Computerized Tomography, EEG: Electroencephalography, vmPFC: Ventromedial Prefrontal Cortex, Quad: Quadriceps, Cont: Continued

psychogenic fits, and 45% had hysterical paralysis. The age at presentation was bimodal; ages 15-25 vs. 45-55 years of age. Two-thirds of the patients were females who mostly had “relationship problems”, while the 1/3 who were males mostly complained of “professional problems”. Eighty percent of both children and adults had severe social problems. Fifty percent were unskilled workers. Just 12% of younger patients had a history of perinatal brain damage. Of interest, an additional 25% had undergone prior gastric/duodenal ulcer surgery.

CLASSIFICATION SYSTEMS FOR PSYCHOLOGICAL/MENTAL DISORDERS

In 2019, Blashfield analyzed 16 different classification systems using 22 common terms to describe psychological/mental disorders that had been used since the 19th century [Table 1].^[2] Three of these descriptions included mania, general paralysis, and senile dementia [Table 1].^[2]

HISTORY OF HYSTERICAL PARALYSIS (HP)/CONVERSION DISORDERS (CD)

Several studies highlighted how inconsistencies in clinical evaluations and ultimately normal neurodiagnostic studies helped differentiate between HP/CD vs. organic spinal disorders [Table 1].^[1,5,13] In 1989, Apple *et al.* evaluated 17 patients presenting with different complaints/patterns of motor paralysis, sensory loss, and sphincter dysfunction; 15 of 17 had normal reflexes despite motor paralysis, and all 17 had intact sphincter control (i.e. despite some complaints of incontinence) [Table 1].^[1] Sixteen of 17 spontaneously improved over an average 3.8 day hospital stay, with 13 recovering full normal function over this period. They recommended obtaining X-ray/other studies early in the work-up of patients with potential HP/CD diagnoses, and that inconsistencies in the neurological examinations were extremely helpful in differentiating between HP/CD and organic spinal disorders. Okun and Koehler (2007) cited Paul BLocq’s (1860-1896) definition of astasia-abasia; “...the inability to maintain an upright posture, despite normal function of the legs in...bed”, while further differentiating this syndrome from typical hysteria [Table 1].^[13] DeBustos (2014) *et al.* reassessed the inconsistent clinical presentation of patients with HP/CD, and broke hysteria down into several main groups [Table 1].^[5] These included; “...paroxysms, attacks, acute manifestations, long-lasting functional syndromes, and visceral events.” The first group included minor/major hysterical attacks, while the second group included “...focal hysterical symptoms, paralyzes, contractures and spasms, anesthesia, and sensory disorders.”

DIFFERENTIATING HYSTERICAL PARALYSIS/ CONVERSION DISORDERS FROM ORGANIC SPINAL PATHOLOGY

The incidence of HP/CD is 5-22/100,000 in the overall population. Here we have summarized how the diagnoses of HP/CD can be differentiated from organic spinal pathology [Table 1].^[6,8,9,12,14,17] Gould *et al.* (1986) observed that 30 patients with organic brain lesions demonstrated at least one of 7 “pathognomonic” findings of hysteria, while many exhibited 3-4.^[6] These criteria included a; “...history of hypochondriasis, secondary gain, la belle indifference, nonanatomic sensory loss, splitting of midline by pain or vibratory stimulation, changing boundaries of hypoalgesia, and giveaway weakness”. Their observations invalidated using these findings to differentiate HP/CD from organic disease.^[6] Additionally; “...movement disorders and paralysis are most often mislabeled as hysteria”, and, “A diagnosis for hysteria must be made with great caution as it so often proves incorrect”.^[6] Further, they showed how major biases impacted who was misdiagnosed with HP/CD; those typically misdiagnosed included women, homosexual men, and those with psychiatric illnesses. Letonoff *et al.* (2002) evaluated 3 females who presented with complaints of complete paralysis/sensory/sphincter loss in the lower extremities, but had intact reflexes/rectal tone, normal laboratory studies, electrodiagnostic evaluations, and imaging studies [Table 1].^[9] Interestingly, all were from low income groups with little education, 2 patients had histories of trauma, and a third patient had prior “hysterical” seizures. Once they were told that they had no “organic disease”, all 3 patients recovered within 6 months during which time they typically required psychiatric help and physical therapy. Zhu *et al.* (2012) cited 2 males who presented with inconsistent neurological deficits that led to the diagnoses of HP/CD; both patients spontaneously fully recovered. Nguyen *et al.* (2013) reported a 29 year-old female who, 4-6 hours following a cesarean section performed under general anesthesia once a spinal anesthetic had failed, developed bilateral lower extremity weakness [Table 1].^[12] Following the normal lumbar MR, she was diagnosed with psychogenic paresis (HP/CD). Interestingly, she had experienced a similar episode several months earlier after a lumbar puncture. Kanchiku *et al.* (2017) used motor evoked potentials (MEP) to rule out organic disease and rule in hysterical motor deficits in 11 teenagers averaging 16.5 years of age [Table 1].^[8] Osman *et al.* (2020) diagnosed 40 functional neurological disorders (FND) out of 1000 new admission to a neuropsychiatric clinic [Table 1].^[14] Those with FND were typically females (60%) with; “...psychogenic nonepileptic seizures (82.5%), speech abnormalities (47.5%), limb paralysis or weakness (35%)...”. About 95% of these patients improved on antidepressant medication and/or with psychotherapy.

CONVERSION PARALYSIS AFTER SPINE SURGERY

Few papers focused on episodes of HP/CD “paralysis” immediately following spine surgery [Table 1].^[7,17] In 2010, Hsieh *et al.* reported a 37 year old female who, one hour after a left L5S1 laminotomy, newly developed left leg weakness; the immediate reoperation showed no significant hematoma or other pathology.^[7] Ten hours following the second surgery, the patient developed recurrent left leg weakness. This time, however, normal neurodiagnostic studies (i.e. including somatosensory evoked (SEP) and motor evoked potentials (MEP)), led to the correct diagnosis of HP/CD.

CONVERSION PARALYSIS AFTER LEG INJURY

In 2012, Stone reported his own experience with transient psychogenic paralysis of a leg following a fall resulting in a torn quadriceps muscle [Table 1].^[15] He developed transient hysterical paralysis postoperatively that required him to regain the ability to walk.

FUNCTIONAL MRI OF PARALYSIS

fMRI, performed in patients with unexplained/inconsistent neurological deficits and normal neurodiagnostic studies, helped identify/differentiate patients with HP/CD vs. organic spinal disease [Table 1].^[4,10,16] In 1997, Marshall *et al.* had a patient with no organic lesion to explain her intermittent left-leg paralysis/sensory loss [Table 1].^[10] On the fMRI, the request to prepare to move the right leg, and actually move the good right leg, resulted in appropriate activation of the left motor/premotor cortex. However, when asked to move the paralyzed left leg, there was just activation documented in the right orbito-frontal and right anterior cingulate cortices. In 2005, Vuilleumier used fMRI to assess the locations of brain activation during HP/CD-related motor paralysis, sensory disturbances, and “blindness”; rather than showing activation in the motor/premotor, somatosensory, and visual cortices respectively, they typically demonstrated increased activity in the cingulate and orbitofrontal areas [Table 1].^[16] Cojan *et al.* (2009) used the go-nogo fMRI tests to demonstrate activation in the precuneus, ventral lateral frontal gyrus, and ventromedial prefrontal cortices rather than the motor/premotor cortex in patients presenting with HP/CD paralysis [Table 1].^[4]

MEDICOLEGAL IMPACT OF MISDIAGNOSING HYSTERICAL PARALYSIS

The diagnoses of HP/CD are diagnoses of exclusion, and should not be established without first obtaining appropriate neurodiagnostic tests and other studies [Table 1].^[1-17] Too frequently females are misdiagnosed with HP/CD, where in fact, they have real spinal pathology. In these cases the

failure to “diagnose and treat”, especially in a timely fashion, can lead to irreversible neurological deficits that should have been avoided. Reviewing a case decades ago from a major academic medical center involved a middle aged female who, following a lumbar laminectomy, was “paralyzed.” Rather than obtaining a MR, she was dismissed as exhibiting “hysterical paralysis”; the next day, the MR showed a hematoma that was then removed. Nevertheless, by that time, her paralysis was permanent/irreversible. There are likely many similar medicolegal cases out there where spine surgeons/other specialists have failed to rule out organic disease and differentiate patients’ real organic complaints (i.e. attributable to spinal-surgical disease) from HP/CD.

CONCLUSION

Patients should not be labeled with HP/CD paralysis until neurodiagnostic/other studies (i.e., variously including MR, CT-Myelo-CT, fMRI, SEP/EMG/ MEP) have ruled out the presence of organic disease.

Declaration of patient consent

Patient’s consent not required as there are no patients in this study.

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Conflicts of interest

There are no conflicts of interest.

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