INTERNATIONAL SPINAL CORD INJURY DATA SET
URODYNAMIC BASIC DATA SET

The International Urodynamic Spinal Cord Injury Basic Data Set was developed by Fin Biering-Sørensen, Michael Craggs, Michael Kennelly, Erik Schick, and Jean-Jacques Wyndaele (see Biering-Sørensen et al. International Urodynamic Basic Spinal Cord Injury Data Set. Spinal Cord 2008). For the terminology of the International Spinal Cord Injury Data Sets cf. Biering-Sørensen et al. The International Spinal Cord Injury Data Sets. Spinal Cord 2006;44(9):530-4.

Acknowledgements
Coloplast A/S, Denmark supported the work with this Data Set with an unconditional grant. We are thankful for comments and suggestions to the International Urodynamic Basic Spinal Cord Injury Data Set received from Susan Charlifue, Lawrence C. Vogel, Vanessa Noonan, William Donovan, Ralph Marino, Karel Everaert, and Amiram Catz. We thank Vanessa Noonan for her help in the endorsement process.

Organisations that have endorsed the International SCI Urodynamic Basic Data Set as of December 11, 2007
International Spinal Cord Society
American Spinal Injury Association
The Neurourology Committee of the International Continence Society
International Society for Physical and Rehabilitation Medicine
American Paraplegia Society

Using the International Urodynamic Spinal Cord Injury Basic Data Set
It is advised to practice with the training cases before implementing International Urodynamic Spinal Cord Injury Basic Data Set.
Try first to fill in a blank scoring sheet (see the International Urodynamic Spinal Cord Injury Basic Data Set Collection Form), and afterwards check with the filled in scoring-sheet to see if the scoring has been done correctly.
The documentation with explanations for the International Urodynamic Spinal Cord Injury Basic Data Set is found in the Introduction to the International Urodynamic Spinal Cord Injury Basic Data Set.

The training cases have been contributed by Per Bagi and Fin Biering-Sørensen, and reviewed by Michael Craggs, Michael Kennelly, and Jean-Jacques Wyndaele.

Questions and suggestions regarding the International Urodynamic Spinal Cord Injury Basic Data Set should be directed to Vanessa Noonan Vanessa.Noonan@vch.ca or Fin Biering-Sørensen finbs@rh.dk.

INTERNATIONAL SPINAL CORD INJURY DATA SETS

URODYNAMIC BASIC DATA SET - FORM

Date performed: YYYYMMDD □ Unknown

Bladder sensation during filling cystometry:
□ Normal □ Increased □ Reduced □ Absent □ Non-specific □ Unknown

Detrusor function:
□ Normal □ Neurogenic detrusor overactivity □ Underactive detrusor
□ Acontractile detrusor □ Unknown

Compliance during filing cystometry:
Low (< 10 mL/cm H_20) □ Yes □ No □ Unknown

Urethral function during voiding:
□ Normal □ Detrusor sphincter dyssynergia □ Non-relaxing urethral sphincter obstruction
□ Not applicable □ Unknown

Detrusor leak point pressure _____ cm H_2O □ Not applicable □ Unknown

Maximum detrusor pressure _____ cm H_2O □ Not applicable □ Unknown

Cystometric bladder capacity _____ mL □ Not applicable □ Unknown

Post void residual volume _____mL □ Not applicable □ Unknown

INTRODUCTION TO THE INTERNATIONAL SPINAL CORD INJURY URODYNAMIC BASIC DATA SET

Collection of data on the urodynamic observations made during urodynamic studies is universal when individuals with spinal cord lesions are evaluated for their lower urinary tract function.

The purpose of the Urodynamic Basic Data Set for Spinal Cord Injury (SCI) individuals is to standardize the collection and reporting of a minimal amount of information from the urodynamic study in daily practice in accordance with purpose and vision of the International Spinal Cord Injury Data Sets (Biering-Sørensen et al. 2006). This will also make it possible to evaluate and compare results from various published studies.

The data in this Urodynamic Basic Data Set will mostly be used in connection with the International SCI Core Data Set (DeVivo et al. 2006), which include information on date of birth and injury, gender, the cause of spinal cord lesion, and the neurologic status, and the Lower Urinary Tract function Basic Data Set (Biering-Sørensen et al. 2008).

The aetiology of a spinal cord lesion may be traumatic or non-traumatic. In the present context, all lesions to the spinal cord, conus medullaris, and cauda equina are included.

It is extremely important that data is collected in a uniform manner. For this reason, each variable and each response category within each variable has been specifically defined in a way that is designed to promote the collection and reporting of comparable minimal data.

Use of a standard format is essential for combining data from multiple investigators and locations. Various formats and coding schemes may be equally effective and could be used in individual studies or by agreement of the collaborating investigators.

In this document The Standardisation of Terminology of Lower Urinary Tract Function: Report from the Standardisation Sub-committee of the International Continence Society. (Abrams et al. 2002) has been followed to describe the variables.

References:

Biering-Sørensen F, Charlifue S, DeVivo M, Noonan V, Post M, Stripling T, Wing P. International spinal cord injury data sets. Spinal Cord 2006 Sep;44(9):530-4.

DeVivo M, Biering-Sørensen F, Charlifue S, Noonan V, Post M, Stripling T, Wing P. International Spinal Cord Injury Core Data Set. Spinal Cord 2006 Sep;44(9):535-40.

Biering-Sørensen F, Craggs M, Kennelly M, Schick E, Wyndaele JJ. International Spinal Cord Injury Lower Urinary Tract function Basic Data Set 2008 (in press).

Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, van Kerrebroeck P, Victor A, Wein A. The Standardisation of Terminology of Lower Urinary Tract Function: Report from the Standardisation Sub-committee of the International Continence Society. Neurourology and Urodynamics 2002:21;167-78.

Weld KJ, Graney MJ, Dmochowski RR. Differences in bladder compliance with time and associations of bladder management with compliance in spinal cord injured patients. J Urol 2000;163:1228-33.

VARIABLE NAME: Date performed

DESCRIPTION: This variable documents the date of data collection of urodynamic observations, i.e. the date for the performance of the urodynamic study.

CODES: YYYYMMDD
Unknown

COMMENTS: The urodynamic study may be carried out at any time after the spinal cord injury. Therefore the date of data collection of urodynamic observations is imperative to be able to identify the data collected in relation to other data collected on the same individual at various time points. In addition, the date is likewise important to have the time interval from date of birth (age), and time interval from date of injury (time since injury).

VARIABLE NAME: Bladder sensation during filling cystometry.

DESCRIPTION: This variable documents the bladder sensation during filling cystometry. Although the bladder sensation is assessed during filling cystometry the assumption that it is sensation from the bladder alone, without urethral or pelvic components may be false (Abrams et al. 2002).

CODES:
Normal
Increased
Reduced
Absent
Non-specific
Unknown

COMMENTS: The above terms are according to the International Continence Society defined as (Abrams et al. 2002):

Normal bladder sensation can be judged by three defined points noted during filling cystometry and evaluated in relation to the bladder volume at that moment and in relation to the patient's symptomatic complaints.

First sensation of bladder filling is the feeling the patient has, during filling cystometry, when he/she first becomes aware of the bladder filling.

First desire to void is defined as the feeling, during filling cystometry, that would lead the patient to pass urine at the next convenient moment, but voiding can be delayed if necessary.

Strong desire to void this is defined, during filling cystometry, as a persistent desire to void without the fear of leakage.

Increased bladder sensation is defined, during filling cystometry, as an early first sensation of bladder filling (or an early desire to void) and/or an early strong desire to void, which occurs at low bladder volume and which persists.

Reduced bladder sensation is defined, during filling cystometry, as diminished sensation throughout bladder filling.

Absent bladder sensation means that, during filling cystometry, the individual has no bladder sensation.

Non-specific bladder sensation, during filling cystometry, may make the individual aware of bladder filling, for example, abdominal fullness or vegetative symptoms.

Unknown is used if the observation regarding bladder sensation during filing cystometry is not available.

VARIABLE NAME: Detrusor function.

DESCRIPTION: This variable documents the function of the detrusor during filling/voiding, i.e. the overactivity is determined during filling, while the acontractility during voiding.

CODES:
Normal
Neurogenic detrusor overactivity
Underactive detrusor
Acontractile detrusor
Unknown

COMMENTS: ***Normal detrusor function*** allows bladder filling with little or no change in pressure. No involuntary phasic contractions occur despite provocation. Normal voiding is achieved by a voluntary initiated continuous detrusor contraction that leads to complete bladder emptying within a normal time span, and in the absence of obstruction. For a given detrusor contraction, the magnitude of the recorded pressure rise will depend on the degree of outlet resistance (Abrams et al. 2002).

Neurogenic detrusor overactivity is an urodynamic observation in individuals with a neurological condition characterized by involuntary detrusor contractions during the filling phase, which may be spontaneous or provoked (Abrams et al. 2002).

Underactive detrusor is defined as a contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or a failure to achieve complete bladder emptying within a normal time span (Abrams et al. 2002).

Acontractile detrusor is one that cannot be demonstrated to contract during urodynamic studies (Abrams et al. 2002).

Unknown is used if the observation regarding detrusor function is not available.

VARIABLE NAME: Bladder compliance during filling cystometry.

DESCRIPTION: Bladder compliance during filling cystometry describes the relationship between change in bladder volume and change in detrusor pressure. Compliance is calculated by dividing the volume change (*ΔV*) by the change in detrusor pressure (*Δpdet*) during that change in bladder volume ($C = \Delta V/\Delta pdet$), expressed in mL/cm H_2O (Abrams et al. 2002).

The International Continence Society recommends to calculate the bladder compliance using two standard points: 1) the detrusor pressure at the start on the bladder filling and the corresponding bladder volume (usually zero), and 2) the detrusor pressure (and corresponding bladder volume) at cystometric capacity or immediately before the start of any detrusor contraction that causes significant leakage (and therefore causes the bladder volume to decrease, affecting compliance calculation). Both points are measured excluding any detrusor contraction (Abrams et al. 2002).

CODES:

Low (< 10 mL/cm H_20):	Yes
	No
Unknown	

COMMENTS: The bladder compliance during filling cystometry in individuals with spinal cord lesions is controversial regarding the level of cut point for normal and low (Weld et al. 2000). Therefore today there is no specific evidence for the 10 mL/H_20, which is used here as point to give low compliance. The value used is a consensus decision based on clinical experience.

Unknown is used if the observation regarding bladder compliance during filling cystometry is not available.

VARIABLE NAME: Urethral function during voiding.

DESCRIPTION: This variable describes the function of the urethra during voiding. The coordination of voiding in individuals with a spinal cord lesion is a concern.

CODES:
Normal
Detrusor sphincter dyssynergia
Non-relaxing urethral sphincter obstruction
Not applicable
Unknown

COMMENTS:
Normal: Normal urethra function during voiding is defined as a urethra that opens and is continuous relaxed to allow the bladder to be emptied at a normal pressure (Abrams et al. 2002).

Detrusor sphincter dyssynergia is defined as detrusor contraction concurrent with an involuntary contraction of the urethral and/or periurethral striated muscle. Occasionally flow may be prevented altogether (Abrams et al. 2002).

Non-relaxing urethral sphincter obstruction is characterised by a non-relaxing, obstructing urethra resulting in reduced urine flow (Abrams et al. 2002).

Not applicable should be used if the individual with a spinal cord lesion for example has acontractile detrusor.

Unknown is used if the observation regarding function during voiding is not available.

VARIABLE NAME: Detrusor leak point pressure during filling cystometry.

DESCRIPTION: This variable documents the detrusor leak point pressure in cm H_2O during filling cystometry. Up to three digits without decimals may be used.

CODES:
XXX cm H_2O
Not applicable
Unknown

COMMENTS: ***Detrusor leak point pressure*** is defined as the lowest detrusor pressure at which urine leakage occurs in the absence of either a detrusor contraction or increased abdominal pressure (Abrams et al. 2002).

Not applicable should be used if the individual with spinal cord lesion for example has an acontractile, high compliant bladder.

Unknown is used if the observation regarding detrusor leak point pressure is not available. If circumstances arise during urodynamics, ie. autonomic dysreflexia that prohibits further urodynamic evaluation, then unknown should be used.

VARIABLE NAME: Maximum detrusor pressure during filling cystometry.

DESCRIPTION: This variable documents the maximum detrusor pressure in cm H_2O during filling cystometry. Up to three digits without decimals may be used.

CODES:
XXX cm H_2O
Not applicable
Unknown

COMMENTS: ***Maximum*** d***etrusor pressure*** is defined as the highest detrusor pressure measured during filling cystometry.

Not applicable should be used if the individual with spinal cord lesion for example has an acontractile, high compliant bladder.

Unknown is used if the observation regarding maximum detrusor pressure during filling cystometry is not available. If circumstances arise during urodynamics, ie. autonomic dysreflexia that prohibits further urodynamic evaluation, then unknown should be used.

VARIABLE NAME: Cystometric bladder capacity during filling cystometry.

DESCRIPTION: This variable documents the cystometric bladder capacity in mL during filling cystometry. Up to four digits without decimals may be used.

CODES:
XXXX mL
Not applicable
Unknown

COMMENTS: ***Cystometric bladder capacity*** during filling cystometry is the bladder volume at the end of the filling cystometrogram, when "permission to void" is usually given. The end point should be specified, for example, if filling is stopped when the patient has a normal desire to void. The cystometric capacity is the volume voided together with any residual urine. In the absence of sensation the cystometric capacity is the volume at which the clinician decides to terminate filling. The reason(s) for terminating filling should be defined, e.g. high detrusor filling pressure, large infused volume or pain. If there is uncontrollable voiding, it is the volume at which this begins. In the presence of sphincter incompetence the cystometric capacity may be significantly increased by occlusion of the urethra e.g. by Foley catheter (Abrams et al. 2002).

Not applicable should be used if the individual with spinal cord lesion for example has > 2000 mL infused with low bladder pressure, but without pain or leakage.

Unknown is used if the observation regarding cystometric bladder capacity during filling cystometry is not available. If circumstances arise during urodynamics, ie. autonomic dysreflexia that prohibits1 further urodynamic evaluation, then unknown should be used.

VARIABLE NAME: Post void residual volume.

DESCRIPTION: This variable documents the post void residual volume. Up to four digits without decimals may be used.

CODES:
XXXX mL
Not applicable
Unknown

COMMENTS: ***Post void residual*** is defined as the volume of urine left in the bladder at the end of micturition (Abrams et al. 2002).

Not applicable should be used if the individual for example empties the bladder with a urostomy.

Unknown is used if the observation regarding post void residual volume is not available.

CASES FOR TRAINING OF THE INTERNATIONAL URODYNAMIC SPINAL CORD INJURY DATA SET

For all the urodynamic investigations shown in the cases below the following abbreviations are used:

Qura:	Flow
Pdet:	Detrusor pressure
Pves:	Vesical pressure
Pabd:	Abdominal pressure
EMGave:	Averaged electromyogram of the urethral sphincter
Div:	Division

c:	cough
CC:	Cystrometric Capacity
FD:	First Desire
ND:	Normal Desire
SD:	Strong Desire

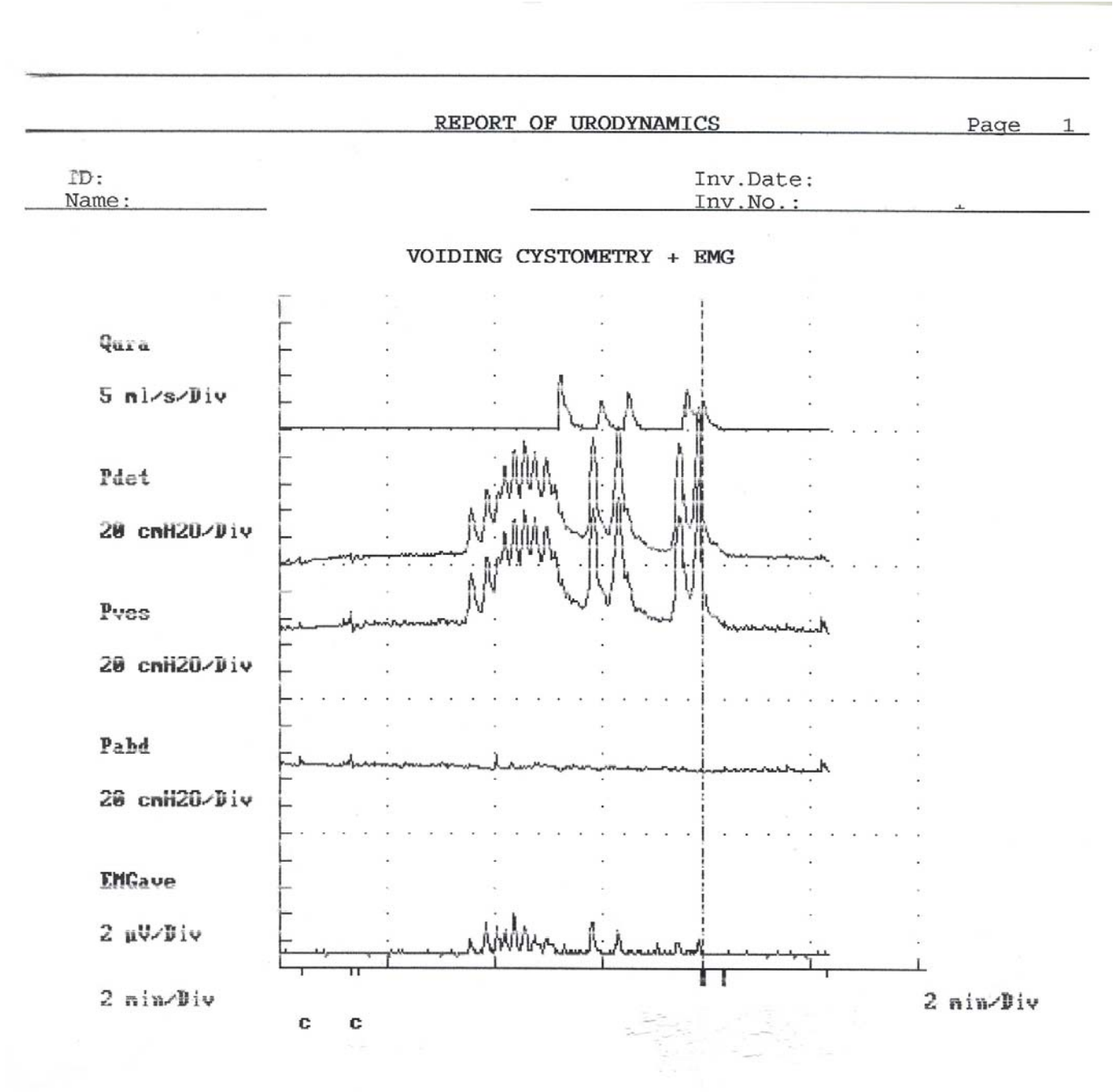
The filling rate is 50 mL per min.

The filling phase is until the vertical dotted line, and the voiding phase after the vertical dotted line.

Post void residual volume cannot be seen from the graph because it is measured by emptying the bladder with catheter after the voiding phase/micturition.

CASES FOR TRAINING OF THE INTERNATIONAL URODYNAMIC SPINAL CORD INJURY DATA SET

CASE 1 FOR URODYNAMIC BASIC DATA SET TRAINING



Post void residual volume 100 mL.
Filling rate 100 mL/division.

URODYNAMIC BASIC DATA SET – FORM
CASE 1

Date performed: 20020604 □ Unknown

Bladder sensation during filling cystometry:
□ Normal □ Increased □ Reduced □ Absent □ Non-specific **X** Unknown

Detrusor function:
□ Normal **X** Neurogenic detrusor overactivity □ Underactive detrusor
□ Acontractile detrusor □ Unknown

Compliance during filing cystometry:
Low (< 10 mL/cm H_20) □ Yes **X** No □ Unknown

Urethral function during voiding:
□ Normal **X** Detrusor sphincter dyssynergia □ Non-relaxing urethral sphincter obstruction
□ Not applicable □ Unknown

Detrusor leak point pressure ___60_____ cm H_2O □ Not applicable □ Unknown

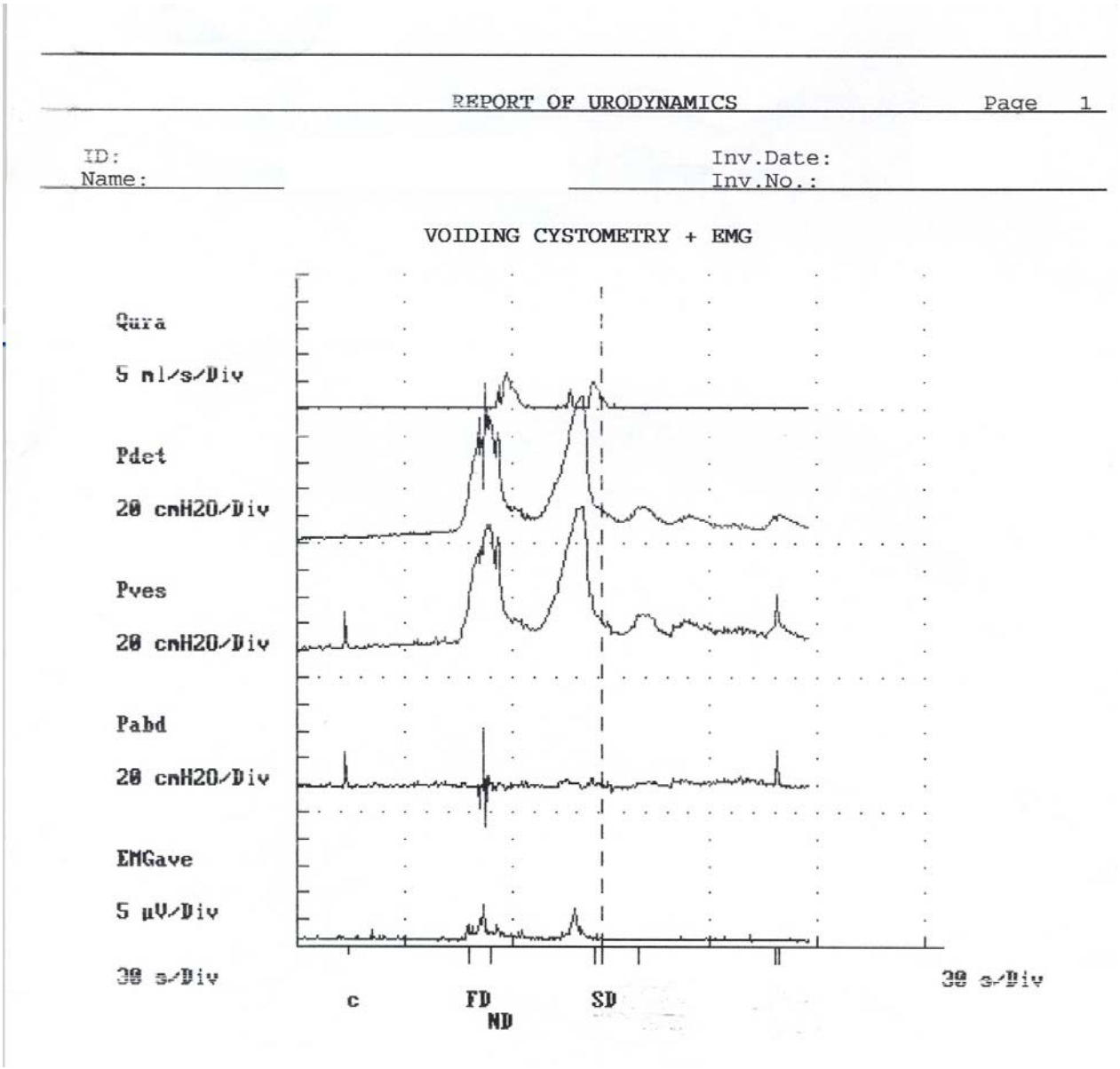
Maximum detrusor pressure ____100___ cm H_2O □ Not applicable □ Unknown

Cystometric bladder capacity ___260__ mL □ Not applicable □ Unknown

Post void residual volume ___100__mL □ Not applicable □ Unknown

CASES FOR TRAINING OF THE INTERNATIONAL URODYNAMIC SPINAL CORD INJURY DATA SET

CASE 2 FOR URODYNAMIC BASIC DATA SET TRAINING



Post void residual volume 26 mL.

Filling rate 25 mL/division.

URODYNAMIC BASIC DATA SET – FORM
CASE 2

Date performed: 20031202 □ Unknown

Bladder sensation during filling cystometry:
□ Normal **X** Increased □ Reduced □ Absent □ Non-specific □ Unknown

Detrusor function:
□ Normal **X** Neurogenic detrusor overactivity □ Underactive detrusor
□ Acontractile detrusor □ Unknown

Compliance during filing cystometry:
Low (< 10 mL/cm H_20) □ Yes **X** No □ Unknown

Urethral function during voiding:
□ Normal **X** Detrusor sphincter dyssynergia □ Non-relaxing urethral sphincter obstruction
□ Not applicable □ Unknown

Detrusor leak point pressure ___80_____ cm H_2O □ Not applicable □ Unknown

Maximum detrusor pressure ____110___ cm H_2O □ Not applicable □ Unknown

Cystometric bladder capacity ___40__ mL □ Not applicable □ Unknown

Post void residual volume ___26__mL □ Not applicable □ Unknown

CASES FOR TRAINING OF THE INTERNATIONAL URODYNAMIC SPINAL CORD INJURY DATA SET

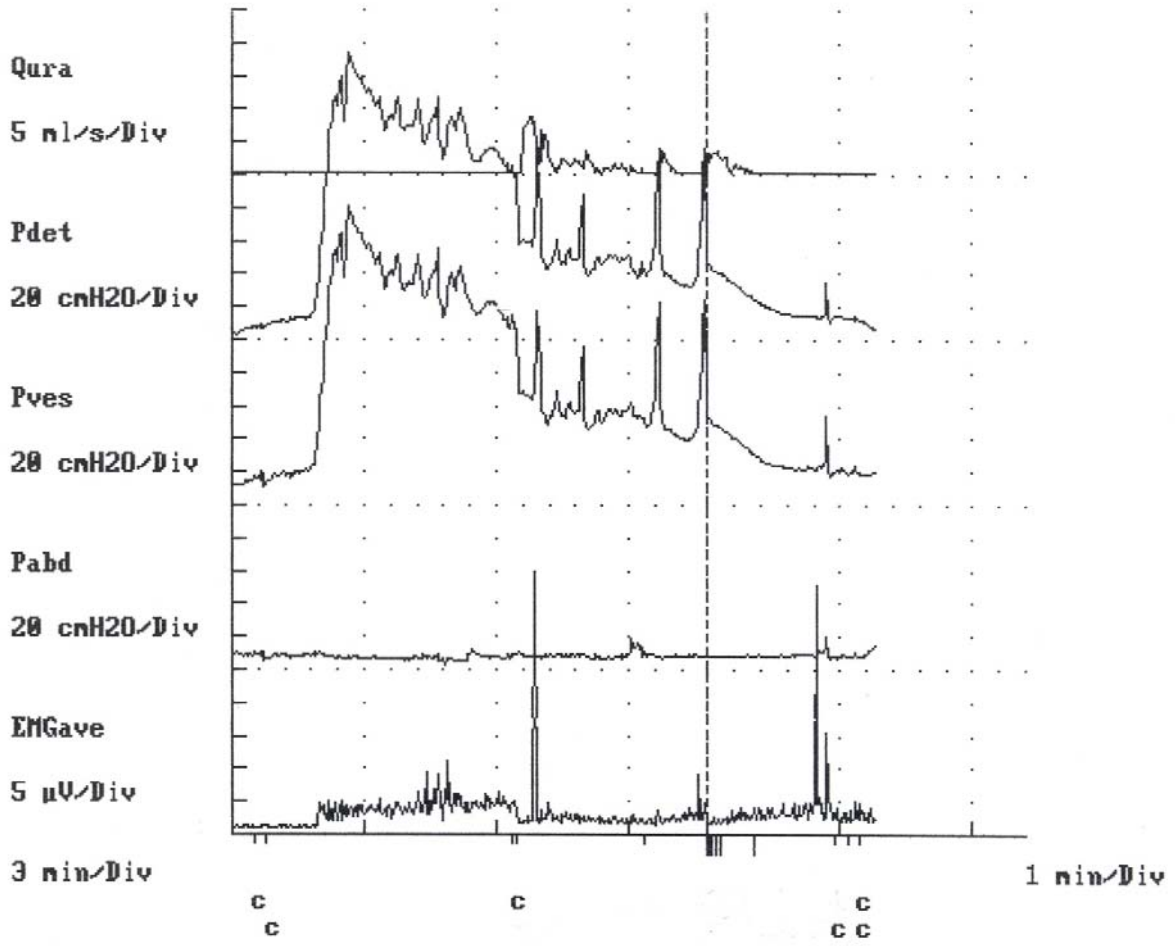
CASE 3 FOR URODYNAMIC BASIC DATA SET TRAINING

REPORT OF URODYNAMICS Page 1

ID:
Name:

Inv.Date:
Inv.No.:

VOIDING CYSTOMETRY + EMG



Post void residual volume 30 mL.

Filling rate 150 mL/division.

URODYNAMIC BASIC DATA SET – FORM
CASE 3

Date performed: 20010130 □ Unknown

Bladder sensation during filling cystometry:
□ Normal □ Increased □ Reduced □ Absent □ Non-specific **X** Unknown

Detrusor function:
□ Normal **X** Neurogenic detrusor overactivity □ Underactive detrusor
□ Acontractile detrusor □ Unknown

Compliance during filing cystometry:
Low (< 10 mL/cm H_20) **X** Yes □ No □ Unknown

Urethral function during voiding:
□ Normal **X** Detrusor sphincter dyssynergia □ Non-relaxing urethral sphincter obstruction
□ Not applicable □ Unknown

Detrusor leak point pressure ___60_____ cm H_2O □ Not applicable □ Unknown

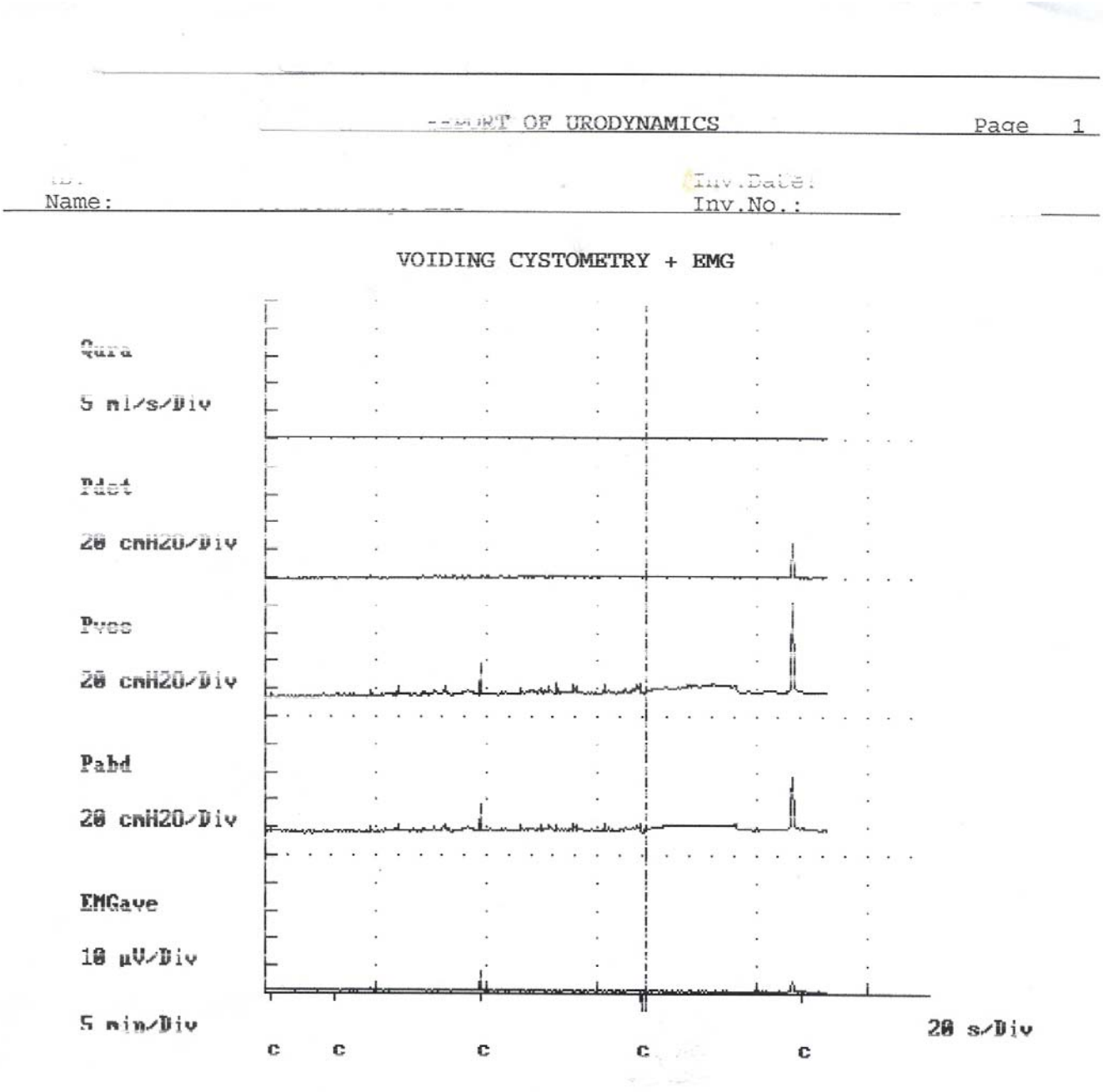
Maximum detrusor pressure ____165___ cm H_2O □ Not applicable □ Unknown

Cystometric bladder capacity ___310__ mL □ Not applicable □ Unknown

Post void residual volume ___30__mL □ Not applicable □ Unknown

CASES FOR TRAINING OF THE INTERNATIONAL URODYNAMIC SPINAL CORD INJURY DATA SET

CASE 4 FOR URODYNAMIC BASIC DATA SET TRAINING



Post void residual volume 859 mL.

Filling rate 250 mL/division.

URODYNAMIC BASIC DATA SET – FORM
CASE 4

Date performed: 20030206 □ Unknown

Bladder sensation during filling cystometry:
□ Normal □ Increased □ Reduced **X** Absent □ Non-specific □ Unknown

Detrusor function:
□ Normal □ Neurogenic detrusor overactivity □ Underactive detrusor
X Acontractile detrusor □ Unknown

Compliance during filing cystometry:
Low (< 10 mL/cm H_20) □ Yes **X** No □ Unknown

Urethral function during voiding:
□ Normal □ Detrusor sphincter dyssynergia □ Non-relaxing urethral sphincter obstruction
X Not applicable □ Unknown

Detrusor leak point pressure _____ cm H_2O **X** Not applicable □ Unknown

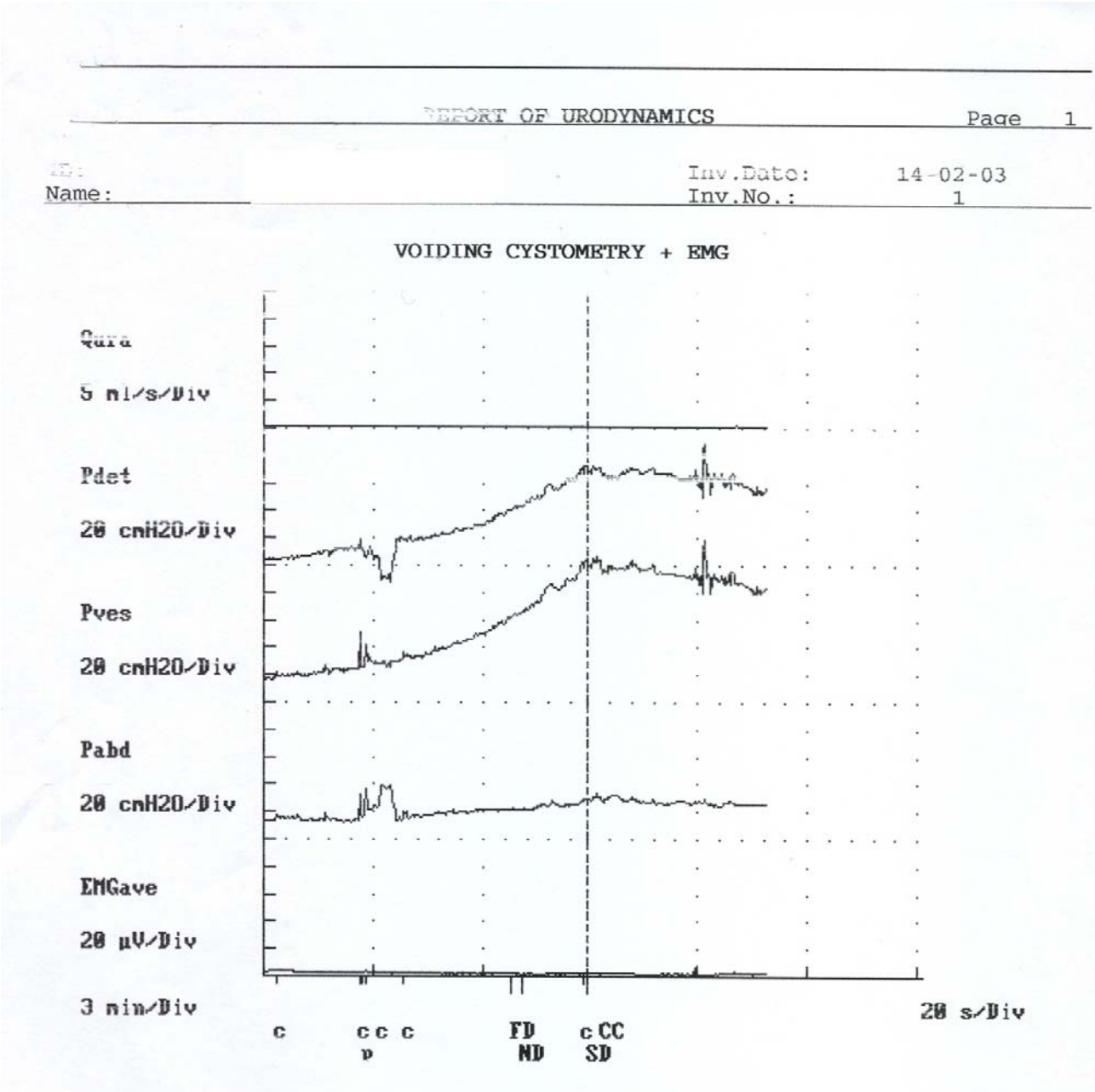
Maximum detrusor pressure ____0_____ cm H_2O □ Not applicable □ Unknown

Cystometric bladder capacity ___859__ mL □ Not applicable □ Unknown

Post void residual volume ___859__mL □ Not applicable □ Unknown

CASES FOR TRAINING OF THE INTERNATIONAL URODYNAMIC SPINAL CORD INJURY DATA SET

CASE 5 FOR URODYNAMIC BASIC DATA SET TRAINING



Post void residual volume 445 mL.
Filling rate 150 mL/division.

URODYNAMIC BASIC DATA SET – FORM
CASE 5

Date performed: 20030214 □ Unknown

Bladder sensation during filling cystometry:
□ Normal □ Increased **X** Reduced □ Absent □ Non-specific □ Unknown

Detrusor function:
□ Normal □ Neurogenic detrusor overactivity □ Underactive detrusor
X Acontractile detrusor □ Unknown

Compliance during filing cystometry:
Low (< 10 mL/cm H_20) **X** Yes □ No □ Unknown

Urethral function during voiding:
□ Normal □ Detrusor sphincter dyssynergia □ Non-relaxing urethral sphincter obstruction
□ Not applicable **X** Unknown

Detrusor leak point pressure _____ cm H_2O **X** Not applicable □ Unknown

Maximum detrusor pressure ____70____ cm H_2O □ Not applicable □ Unknown

Cystometric bladder capacity ___445__ mL □ Not applicable □ Unknown

Post void residual volume ___445__mL □ Not applicable □ Unknown