The creation of a new database based on the Landriel classification of complications to monitor the activity of a Neurosurgical high volume center. Preliminary considerations on 120 cases

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INTRODUCTION

A 4-grade treatment-based classification of complications in neurosurgery has been recently proposed by Landriel-Ibanez et al. (1). The grading system is based on the kind of treatment required by the specific complication.
Grade 1: no invasive treatment required.
Grade 2: invasive treatment required, but not ICU.
Grade 3: invasive treatmente required and ICU.
Grade 4: death.
This classification is derived from the Dindo proposal for adverse events in abdominal surgical procedures (2). I, II and III grades are further subgrouped in a and b types depending on the severity of the complication. In addition, new neurological deficits are specified as transient or persistent at 1 month follow-up. We started its use to monitor complications in a two months period and critically reviewed the data in order to analyse advantages and limits and create a data base useful to monitor the activity of a Neurosurgical high volume department.

PATIENTS AND METHODS

A series of 120 cosecutive patients operated at the Istituto Neurologico Besta of Milano between Jan 2nd and Feb 29th 2012 was analysed. The surgical procedures (table 1 and 2) included different cranial and spine pathologies.

Table 1

CASE MIX Spinal: 45 cases

- Vascolar: 5 DAVFs
- Oncological: 4 (2 spinal neuromas 2 spinal cord tumors)
- Degenerative: 10 cervical
  (7 disc herniation + 3 stenosis)
  25 lumbar
  (17 disc herniation + 8 stenosis)
- Miscellaneous: 1 arachnoid cyst

Table 2

CRANIAL CASE MIX : 76 CASES

– Vascular diseases: 22 cases
(8 aneurysms, 1 AVM, 5 cerebellar cavernomas, 8 MVD procedures)

– Oncological diseases: 44 cases
(12 high grade gliomas, 8 transsphenoidal procedures for pituitary adenomas or craniopharingiomas, 1 clivus chordoma, 13 meningeomas, 3 acoustic neuromas, 2 low cranial nerve neuromas,1 cerebellar medulloblastoma, 1 pilocytic cerebellar astrocytoma; 1 posterior fossa dermoyd 1 plessopapilloma 1 pontine glioma)

– Hydrocephalus: 4 cases

– Miscellaneous: 6 cases

RESULTS

Mortality was null and morbidity was rated as: Grade I 17,2% (12 cases-14,4% Ia; 4 cases-4,8% Ib); Grade II 4,8% (2 cases-2,4% IIa; 2 cases-2,4% IIb); Grade IIIb 1 (1,2%), Table 3. The total complication rate was 17,5 %. More than 90% of complications occurred in cranial cases and were surgical ones.

Table 3

Table 4: Complication grades (Landriel Ibanez model)

Grades	Surgical complications	Medical Complications
Ia (15)	T cranial nerve deficit due to manipolation (8) P cranial nerve deficit due to manipolation (4) P cauda equina syndrome (1) P visual field defect due to ischemic damage (1) P new motor deficit due to ischemic damage (1)	
Ib (3)	T new motor deficit (1) P new motor deficit (1)	Pulmonary embolism (1)
IIa (2)	Subgaleal CFS accumulation (lumbar puncture) (2)	
IIb (2)	Lumbar hematoma post-laminectomy (1); CSF nasal leakage (1)	
IIIa (1)	Cerebellar swelling (1)	
IIIb (0)		
IV (0)		

T= transient; P=permanent; CFS= cerebrospinal fluid;

Complication in detail

DISCUSSION AND CONCLUSIONS

Landriel-Ibanez scale could be easily applicated to the kind of surgical activity that was performed in our Department. It appeared to be immediate and allowed to avoid the specification of the endless list of the kind of complications that can occur after neurosurgical procedures. However, a crucial requirement that such a classification should provide is the creation, for each class, of a homogeneous subgroup of patients that effectively reflect the real impact of complications on their quality of life and the the costs of surgery for families and society. On the other hand long term neurological deficits in Patients in class I should be much less severe than those of patients in class II or III.

As far as this aspect is concerned we found that the Landriel-Ibanez classification seems not to provide enough information about definitive outcome of surgery. The lack of need for invasive treatment or ICU admission makes a complication such as hemiplegia due to an ischemic damage of the pyramidal tract being graded the same as diplopia due to IV cranial nerve disfuncion. Clearly, the personal and social impact of these grade I complications is immensely different and strongly influences the quality considerations about the neurosurgical center. Besides, this classification doesn't specify when a postoperative neurological deficit should be defined as persistent. Houkin, for example, defines morbidity as transient when the symptoms resolve within 1 year (3). We believe that after six month a neurological deficit can be considerated persistent. Furthermore, a neurosurgical classification should be applied keeping into account both severity of disease and complexity of the procedure in order not to expose different centers to a quality rating that can result completely misleading. In this view, in order to maintain the classification usefulness, it is necessary to compare homogeneous groups of patients in terms of disease severity and surgical complexity. In our wiev it is essential, for providing data useful for an inter-institutional comparison of surgical results, that different cases are categorized according to the estimated surgical complexity in a few homogeneous subgroups, as Dindo et al suggested (2). This is the only way to avoid that simple cases are selected in order to improve the quality rate of a single center/surgeon.
With these modifications Landriel-Ibanez classification might become a powerful tool for the inter-institutional evaluation of results of surgery and of the quality impact of new surgical techniques.

References
1) Landriel Ibanez FA, et al: A new classification of complications in Neurosurgery. World Neurosurgery 75; 709-715, 2011.
2) Dindo D, et al: Classification of surgical complications. A new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 240; 205-213, 2004.
3) Houkin K, et al: Quantitative analysis of adverse events in neurosurgery. Neurosurgery 65; 587-594, 2009.