INCIDENCE OF ISCHEMIC STROKE SUBTYPES AMONG THE POPULATION OF THE COUNTY OF SIBIU: A PROSPECTIVE STUDY

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Keywords: ischemic stroke, stroke subtypes, TOAST classification, Bamford – Oxfordshire classification

Abstract: *Ischemic stroke is a heterogeneous disease, with different subtypes, each of them presenting specific etiopathogenic aspects. Purpose: The study of different ischemic stroke subtypes according to TOAST and Bamford/Oxfordshire classifications among the population of the county of Sibiu. Methods: In a prospective study, 430 patients with ischemic stroke hospitalized between January and December 2009 in Sibiu Neurology Department were evaluated. They were divided into stroke subtypes according to TOAST and Bamford/Oxfordshire classifications. Results: All 430 patients with ischemic stroke (average age 64,67 years old) were divided according to TOAST criteria as follows: 136 (31,63%) LAA, 48 (11,16%) CE, 107 (24,88%) SAA, 6 (1,4%) OE and 133 (30,93%) UE. According to Bamford/Oxfordshire classification, the distribution of the patients was as follows: 25 (5,81%) TACI, 199 (46,28%) PACI, 121 (28,14%) LACI and 85 (19,77%) POCI. Conclusions: The incidence of ischemic stroke subtypes according to both classifications overlap the values reported in the literature, except for the undetermined etiology TOAST subtype and TACI and PACI Bamford – Oxfordshire subtypes, whose incidence were higher than all published data.*

Cuvinte cheie: infarctul cerebral, subtipuri de AVC, clasificarea TOAST, clasificarea Bamford/Oxfordshire

Rezumat: *Accidentul vascular cerebral ischemic (AVCI) este o boală heterogenă, cu subtipuri distincte, fiecare dintre acestea prezentând aspecte clinice și etiopatogenetice diferite. Obiectiv: Studiul incidenței diferitelor subtipuri de AVCI conform clasificărilor TOAST și Bamford/Oxfordshire în rândul populației județului Sibiu. Metode: Într-un studiu prospectiv, au fost evaluați 430 de pacienți cu AVCI internați consecutiv în perioada ian. – dec. 2009 în Clinica de Neurologie Sibiu. Aceștia au fost împărțiți pe subtipuri de AVC conform clasificărilor TOAST și Bamford/Oxfordshire. Rezultate: Cei 430 de pacienți cu AVCI (vârsta medie 64,67 de ani), conform clasificării TOAST, au fost împărțiți astfel: 136 (31,63%) LAA, 48 (11,16%) CE, 107 (24,88%) SAA, 6 (1,4%) OE și 133 (30,93%) UE. Conform clasificării Bamford/Oxfordshire distribuția pacienților a fost următoarea: 25 (5,81%) TACI, 199 (46,28%) PACI, 121 (28,14%) LACI și 85 (19, 77%) POCI. Concluzii: Incidența subtipurilor de AVCI conform celor două clasificări a fost concordantă cu valorile raportate în literatură, excepție făcând subtipul TOAST de AVC cu etiologie nedeterminată și subtipurile Bamford TACI și PACI a căror incidență a fost superioară celor raportate în literatură.*

INTRODUCTION

Stroke represents one of the leading causes of morbidity and mortality worldwide. Ischemic stroke is classified according to various criteria, amongst which we specify the temporal criteria (transient, acute, subacute stroke), imagistic location criteria, affected vascular territory criteria, etiologic and even pathogenic criteria. Often, all these criteria are part and parcel of the final diagnosis, but sometimes an accurate classification of the stroke is not possible. Therewith, stroke subtype decisively influences patients' prognosis and evolution.(1)

Bamford/Oxfordshire classification is a clinical – imagistic classification which includes clinical – semiological aspects and vascular territorial distribution of the stroke. It was first used in 1991 by Bamford and collaborators in a clinical study on 675 patients.(2)

A practical classification of cerebral infarcts is TOAST classification which includes various etiological and imaging aspects, still remaining compact and flexible. It was first used in 1993, in a large clinical study by Adams and collaborators.(2,3)

PURPOSE

In this study we analyzed the incidence of the different ischemic stroke subtypes according to TOAST and Bamford/Oxfordshire classifications specific to our geographical area.

METHODS

We made a prospective study on 430 patients with ischemic stroke admitted in the Neurology Department of Sibiu between 01.01.2009 and 31.12.2009.

The presence upon admission of ischemic stroke characteristic symptoms confirmed by CT or brain MRI was the inclusion criterion for this study. The patients without imaging confirmation of ischemic stroke were excluded from the study.

Based on clinical and imaging data, the patients were divided into four categories in accordance with ischemic stroke subtypes based on Bamford/Oxfordshire classification: TACI = total anterior circulation stroke, PACI = partial anterior

circulation stroke, LACI = lacunar stroke, POCI = posterior circulation stroke. Based on the evaluation of clinical and imaging aspects, associated pathology and the data obtained from laboratory investigations, the patients were divided into five categories in accordance with ischemic stroke subtypes according to TOAST criteria: LAA = macroangiopathy or large artery atherosclerosis, SAA = microangiopathy or small artery occlusion, CE = cardioembolism, OE = stroke of other determined etiology, UE = stroke of undetermined or concomitant etiology. Statistical processing was made with IBM SPSS Statistics 19 version.

RESULTS

The study population consisted of 430 ischemic stroke patients with the mean age - 64.67 years old, aged between 35 and 89 years old. 253 patients (58.84%) were males and 177 patients (41.16%) females, the men:women ratio being approximately 1.5:1. The distribution of all 430 patients on Bamford/Oxfordshire ischemic stroke subtypes and subtype-specific demographic data are presented separately in table and figure no. 1.

Table no. 1. Baseline characteristics for Bamford ischemic stroke subtypes

Stroke subtype	No. of patients (%)	Mean age, y	Male/female (ratio)
TACI	25 (5,8)	65,32	1/1,08
PACI	199 (46,3)	66,55	1,4/1
LACI	121 (28,1)	62,47	1,5/1
POCI	85 (19,8)	63,23	1,5/1

**Figure no. 1. The distribution of patients according to Bamford/Oxfordshire stroke subtypes**
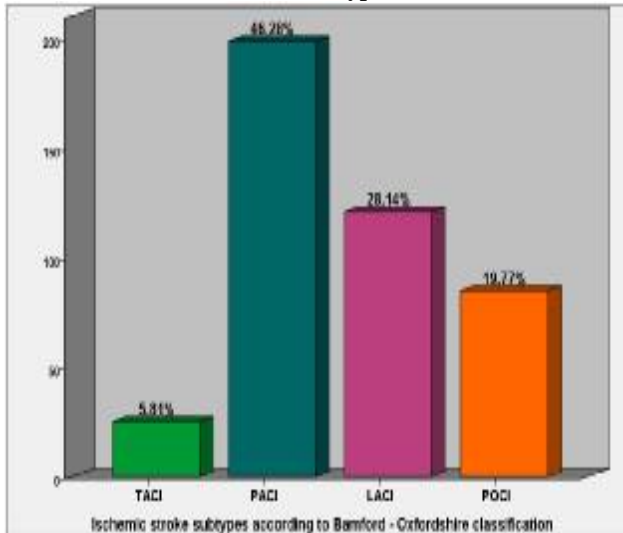
The distribution of all 430 patients on TOAST ischemic stroke subtypes and subtype – specific demographic data are presented separately in table and figure no. 2.

Table no 2. Baseline characteristics for TOAST ischemic stroke subtypes

Stroke subtype	No. of patients (%)	Mean age, y	Male/female (ratio)
LAA	136 (31,6)	67,65	1,7/1
SAA	107 (24,9)	61,64	1/1,4
CE	48 (11,2)	68,66	1,6/1
OE	6 (1,4)	52,16	2/1
UE	133 (30,9)	63,19	1,4/1

Figure no 2. The distribution of patients according to TOAST stroke subtypes
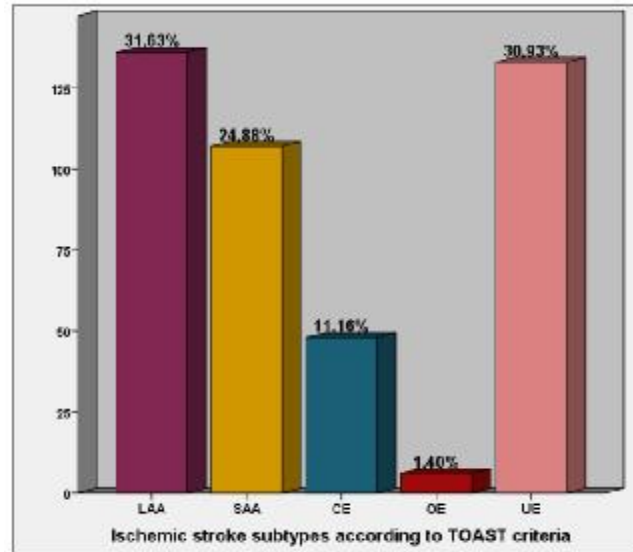
DISCUSSIONS

In a meta-analysis published in 2011 regarding the frequency of stroke subtypes according to Bamford/Oxfordshire classification, a great variability of stroke subtypes is noticed, largely dependent on the geographic area studied: TACI between 3.7 – 37.2%, PACI between 18 - 42.6%, LACI between 17.2 - 56.4%, POCI between 4.5 - 30.9% [4].

Of all 430 patients with supratentorial ischemic stroke followed in our study, 121 (28.14%) had lacunar stroke (LACI), and 199 patients (46.28%) had partial anterior circulation stroke (PACI), a larger frequency than the one reported by Bamford in his original work (5) and by other researchers.(4)

85 patients (19.77%) had posterior circulation stroke (POCI), and total anterior circulation stroke (TACI) was diagnosed in 25 cases (5.81%), values ranging between those published by other authors.(4)

The distribution of TOAST ischemic stroke subtypes present in the studied patients fall within the ranges published in the literature (LAA between 9.3-35.8%, CE between 8-27.8%, SAA between 15.3-43%, OE between 1-3.4%, UE from 13-28.7%),(6,7,8,9,10,11) except for the stroke of undetermined etiology with a higher incidence probably due to low diagnostic efficiency specific to our region.

CONCLUSIONS

The incidence of ischemic stroke subtypes according to the two classifications corresponded to the values reported in the literature, except for TOAST stroke of undetermined etiology subtype and Bamford/Oxfordshire TACI and PACI subtypes whose incidence was superior to those reported in literature, the latter being correlated with stroke due to large vessel disease (atherosclerosis).

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