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ORIGINAL ARTICLE

Analysis of the new code stroke protocol in Asturias after one year. Experience at one hospital☆

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Abstract
Introduction: Prehospital code stroke (CS) systems have been proved effective for improving access to specialised medical care in acute stroke cases. They also improve the prognosis of this disease, which is one of the leading causes of death and disability in our setting. The aim of this study is to analyse results one year after implementation of the new code stroke protocol at one hospital in Asturias.
Patients and methods: We prospectively included patients who were admitted to our tertiary care centre as per the code stroke protocol for the period of one year.
Results: We analysed 363 patients. Mean age was 69 years and 54% of the cases were men. During the same period in the previous year, there were 236 non-hospital CS activations. One hundred forty-seven recanalisation treatments were performed (66 fibrinolysis and 81 mechanical thrombectomies or combined treatments), representing a 25% increase with regard to the previous year.
Conclusions: Recent advances in the management of acute stroke call for coordinated code stroke protocols that are adapted to the needs of each specific region. This may result in an increased number of patients receiving early care, as well as revascularisation treatments.

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PALABRAS CLAVE
Código ictus;
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Análisis del primer año del nuevo protocolo de código ictus en Asturias. Experiencia de un único centro

Resumen
Introducción: Los sistemas de código ictus prehospitalario han demostrado ser eficaces en la mejoría del acceso a una atención médica especializada en el ictus agudo y en condicionar un mejor pronóstico en la enfermedad, que es una de las principales causas de muerte y discapacidad en nuestro medio. El objetivo de este estudio es analizar los resultados del primer año de puesta en marcha del nuevo protocolo de código ictus (CI) en Asturias en un solo centro.
Pacientes y métodos: Se incluye de forma prospectiva a los pacientes que acuden dentro del protocolo de código ictus a un centro de tercer nivel asistencial durante el periodo de un año.
Resultados: Se analiza a 363 pacientes. La edad media fue de 69 años y en el 54% de los casos se trataba de varones. Para el mismo periodo del año previo las activaciones extrahospitalarias de CI fueron 236. Se llevaron a cabo 147 tratamientos recanalizadores (66 fibrinólisis y 81 trombectomías mecánicas o tratamientos combinados), lo que supuso un incremento del 25% con respecto al año previo.
Conclusiones: Los recientes avances en la terapéutica del ictus agudo hacen necesaria la instauración de protocolos coordinados de CI que se adapten a las necesidades de cada región concreta, lo que puede resultar en un incremento del número de pacientes atendidos precozmente, así como de los tratamientos revascularizadores realizados.

Introduction

Cerebrovascular diseases are the most common cause of disability in adults and one of the main causes of death in Spain.[1] In the specific case of Asturias, stroke has become the leading cause of death in women in the region and the third most frequent in men.[2] Several treatment measures developed in recent decades have improved the prognosis of stroke patients. Such measures include the introduction of tissue plasminogen activator (IV tPA),[3] approved in Europe in 2002, and the more recent validation of endovascular treatment for stroke secondary to large-vessel occlusion (LVO).[4–10]

Another important treatment measure was the 2006 Helsingborg Declaration,[11] which proposed stroke units (SU) as the most effective hospital resource for managing acute stroke and established a clear objective for 2015: to ensure that all stroke patients receive assessment in a stroke unit.

In light of the above, the creation of a coordinated code stroke (CS) protocol tailored to the specific needs of each region is a vital step towards ensuring that all patients will have quick, efficient access to a centre of reference in cerebrovascular disease. Coordinated, well-organised CS protocols require cooperation between neurology departments and prehospital emergency services.[12]

These protocols must also include diagnostic tools that assist in triaging patients by stroke severity so as to refer each one to the most suitable hospital. The National Institute of Health Stroke Scale (NIHSS) is the most widely used and validated scale both for diagnosis and for predicting stroke outcomes. A cut-off point of 10 has been found to predict presence of an LVO with high sensitivity and specificity.[13] Other scales, such as the Los Angeles Prehospital Stroke Screen (LAPSS), have been widely used in prehospital stroke triage and are of comparable effectiveness to the NIHSS for diagnosing LVO, given a cut-off point of 4.[14] Despite there being a wide range of stroke scales other than the LAPSS, most of which are based on a selection of items from the original NIHSS (examples include the Rapid Arterial Occlusion Evaluation [RACE[15]] scale and the sNIHSS-4[16]), the NIHSS is the prehospital triage tool which has most commonly been used by physicians and paramedics over the years.

The region of Asturias covers a territory of 10 603.57 km^2 and has 1 051 229 inhabitants according to the most recent data from Spain's National Statistics Institute.[17] This region is characterised by rugged terrain and a population that is scattered widely across its outlying areas, which even today leads to communication problems.

The province of Asturias is divided into 8 health districts (Fig. 1), each of which has a reference hospital. Only the reference hospitals in health districts IV (Hospital Universitario Central de Asturias [HUCA], Oviedo) and V (Hospital de Cabueñes, Gijón) have an on-call neurologist available 24 hours a day, 7 days a week; a stroke unit; and the ability to perform acute stroke treatment (both IV tPA and endovascular therapy at the HUCA and only IV tPA at Hospital de Cabueñes).

The protocol for stroke management used in Asturias before the implementation of CS is now obsolete; previous studies already proposed endovascular therapy as an effective alternative to intravenous fibrinolysis.[18–20] Before the CS was introduced, patients in health district V were referred to Hospital de Cabueñes, a hospital equipped to provide only IV tPA and unable to perform endovascular