GRAY MATTERS

INTERNATIONAL LEAGUE AGAINST EPILEPSY
Established 1909

LETTERS

What proportion of cases of epilepsy are actually caused by neurocysticercosis?

To the Editors:

The recent study by Del Brutto et al.[1] sought to determine the association between neurocysticercosis (NC) and epilepsy in an endemic rural population in Ecuador, explaining that their study addressed selection bias likely present in earlier studies, many of which have been scrutinized in recent reviews.[2,3] As the authors acknowledge, Prasad et al.[4] also conducted a population-based study in India some years before, finding similar results, that is, that people with epilepsy had greater odds of also having NC.

There is abundant information that all evolutive phases of the parasite in the brain, including calcification, are related to seizures.[5] A genetic predisposition for low seizure threshold in patients with NC who develop epilepsy may exist,[6] which would explain the substantial number of asymptomatic cases of NC in the population.[7,8] An interesting finding of the Del Brutto et al. study is that about 9% of the population had calcifications in the brain and were asymptomatic, which is very similar to a study carried out in rural Mexico,[8] which found that 9.1% of apparently healthy participants had calcifications, probably due to NC, and were asymptomatic. Calcifications, of course, could correspond to other pathologies,[9] but differential diagnosis would need to be established in a setting, such as a tertiary hospital, where additional diagnostic tools are available.

We agree that there is no question that NC is one of many potential causes of epilepsy in some endemic countries, but we would argue that the true unknown question is the following: what proportion of cases of epilepsy are solely caused by NC? Unfortunately, this study and other cross-sectional studies cannot get us closer to answering this question, because temporality cannot be determined. Furthermore, because NC can be both a cause of epilepsy and an incidental finding, other potential causes of epilepsy need to be carefully ruled out before attributing epilepsy to NC. Type of neuroimaging is very important, because use of computed tomography (CT) alone may obscure some causes of epilepsy. It is probably time to recognize that CT alone may be limited in properly assessing etiology in patients with epilepsy for epidemiological studies and its use may lead to biased estimates. Depending on the magnetic resonance imaging (MRI) technique, dual pathology can be demonstrated in between 20% and 30% of cases.[10] This raises the question of whether epilepsy could have been wrongly attributed to NC in a substantial number of cases in the present study, as MRI data were available for less than one-third of participants, notwithstanding that calcifications could have corresponded to pathologies other than NC.

We argue that it is time to cease initiating more cross-sectional studies that tell us that NC and epilepsy are associated. This question has been answered many times and the answer will not change. It is time to conduct a prospective cohort study enrolling patients with new onset seizures and NC to tell us how many of these patients actually develop epilepsy. Additionally, epidemiological studies must emerge using MRI, at least in the cases selected for neurological examination, to ascertain the etiology of epilepsy.

DISCLOSURE

The authors declare no conflicts of interest. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Arturo Carpio[1,2]
arturocarpio@etapanet.net
Matthew L. Romo[3]
José F. Tellez-Zenteno[4]
[1]School of Medicine, University of Cuenca, Cuenca, Ecuador;
[2]G. H. Sergievsky Center, College of Physicians and Surgeons, Columbia University, New York, New York, U.S.A.;
[3]Department of Epidemiology and Biostatistics, Institute for Implementation Science in Population Health, CUNY Graduate School of Public Health and Health Policy, City University of New York, New York, New York, U.S.A.; and
[4]Division of Neurology, Department of Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

REFERENCES

1. Del Brutto OH, Arroyo G, Del Brutto VJ, et al. On the relationship between calcified neurocysticercosis and epilepsy in an endemic village: a large-scale, computed tomography-based population study in rural Ecuador. *Epilepsia* 2017;58:1955–1961.
2. Tellez-Zenteno JF, Hernandez-Ronquillo L. Epidemiology of neurocysticercosis and epilepsy, is everything described? *Epilepsy Behav* 2017 May 16. pii: S1525-5050(16)30770-3.
3. Gripper LB, Welburn SC. The causal relationship between neurocysticercosis infection and the development of epilepsy—a systematic review. *Infect Dis Poverty* 2017;6:31.
4. Prasad KN, Verma A, Srivastava S, et al. An epidemiological study of asymptomatic neurocysticercosis in a pig farming community in northern India. *Trans R Soc Trop Med Hyg* 2011;105:531–536.

5. Carpio A, Romo ML. The relationship between neurocysticercosis and epilepsy: an endless debate. *Arq Neuropsiquiatr* 2014;72:383–390.
6. Carpio A, Romo ML. Multifactorial basis of epilepsy in patients with neurocysticercosis. *Epilepsia* 2015;56:973–974.
7. Winkler AS, Richter H. Landscape analysis: management of neurocysticercosis with an emphasis on low- and middle-income countries, 2015. Commissioned by the World Health Organization. Available at: http://apps.who.int/iris/bitstream/10665/152896/1/WHO_HTM_NTD_NZD_2015.05_eng.pdf. Accessed September 24, 2017.
8. Fleury A, Gomez T, Alvarez I, et al. High prevalence of calcified silent neurocysticercosis in a rural village of Mexico. *Neuroepidemiology* 2003;22:139–145.
9. Grech R, Grech S, Mizzi A. Intracranial calcifications. A pictorial review. *Neuroradiol J* 2012;25:427–451.
10. Cendes F, Cook MJ, Watson C, et al. Frequency and characteristics of dual pathology in patients with lesional epilepsy. *Neurology* 1995;45:2058–2064.

Response to Letter

Response: Neurocysticercosis and epilepsy

To the Editors:

The interest of Carpio and colleagues in neurocysticercosis and epilepsy is commendable. However, it is difficult to understand the message of their letter. Are they proposing that research in neurocysticercosis and epilepsy be discontinued? That population magnetic resonance imaging (MRI)–based studies are performed in endemic areas with only participants being evaluated in highly specialized centers? None of these options seem to be reasonable or feasible. Of course, the need for longitudinal studies is sound, and this is precisely what we are doing in Atahualpa, as detailed elsewhere.[1,2]

There are also some inaccuracies in Carpio's letter. In our study, MRI studies were not performed in a small percentage but rather in most individuals with neurocysticercosis (81/118), and no unrelated epileptogenic lesions were found. The study by Prasad et al.[3] is not directly comparable with our findings because the authors assessed a selected high-risk population, and the Mexican study[4] only evaluated 154 individuals with CT (compared to the 1,228 CTs performed in our study) and thus results might not have the same power. In addition, most of the arguments mentioned in the letter to disparage our findings (cysticercotic lesions as innocent bystanders, potential dual pathology) were already addressed in the discussion section of our paper.[5]

Neurocysticercosis experts believe that more research on the association between neurocysticercosis and epilepsy is needed.[6–8] Even the results of a recent systematic review and meta-analysis strongly suggest that additional information on this topic is desirable.[9] Hopefully, the scientific community will benefit from more publications on the subject.

Disclosure

The author has no conflict of interest to disclose. I confirm that I have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Oscar H. Del Brutto
School of Medicine, Universidad Espíritu Santo – Ecuador, Guayaquil, Ecuador

References

1. Del Brutto OH, Engel Jr J, Eliashiv DS, et al. Hippocampal sclerosis: the missing link of cysticercosis epileptogenesis. *Epilepsia* 2014;55:2077–2078.
2. Del Brutto OH, Salgado P, Lama J, et al. Calcified neurocysticercosis associates with hippocampal atrophy: a population-based study. *Am J Trop Med Hyg* 2015;92:64–68.
3. Prasad KN, Verma A, Srivastava S, et al. An epidemiological study of asymptomatic neurocysticercosis in a pig farming community in northern India. *Trans R Soc Trop Med Hyg* 2011;105:531–536.
4. Fleury A, Gomez T, Alvarez I, et al. High prevalence of calcified silent neurocysticercosis in a rural village of Mexico. *Neuroepidemiology* 2003;22:139–145.
5. Del Brutto OH, Arroyo G, Del Brutto VJ, et al. On the relationship between calcified neurocysticercosis and epilepsy in an endemic village: a large-scale, computed tomography-based population study in rural Ecuador. *Epilepsia* 2017;58:1955–1961.
6. Nash TE, Mahanty S, Loeb JA, et al. Neurocysticercosis: a natural human model of epileptogenesis. *Epilepsia* 2015;56:177–183.
7. Burneo JG, Cavazos JE. Neurocysticercosis and epilepsy. *Epilepsy Curr* 2014;14(Suppl. 1):23–28.
8. Bianchin MM, Velasco TR, Wichert-Ana L, et al. Understanding the association of neurocysticercosis and mesial temporal lobe epilepsy and its impact on the surgical treatment of patients with drug-resistant epilepsy. *Epilepsy Behav* 2017 Apr 24. pii: S1525-5050(16)30668-0.
9. Debacq G, Moyano LM, Garcia HH, et al. Systematic review and meta-analysis estimating association of cysticercosis and neurocysticercosis with epilepsy. *PLoS Negl Trop Dis* 2017;11:e0005153.

Announcements

8th EPODES – Basic Epilepsy Surgery Course

22–26 January 2018
Brno, Czech Republic
Website: http://www.ta-service.cz/epodes2018/

Lennox-Lombroso Pediatric Epilepsy Conference

2–3 February, 2018
Boston, MA
CME Credits
Website: https://bostonchildrens.cloud-cme.com/Aph.aspx?P=1&EID=416

10th World Congress for Neurorehabilitation

7–10 February 2018
From neurotechnologies to community care
Powai, Mumbai, India
Website: www.wcnr2018.in

62nd Scientific Annual Meeting of the German Society for Clinical Neurophysiology and Functional Imaging

15–17 March 2018
Berlin, Germany
More information: https://www.ilae.org/congresses/62nd-scientific-annual-meeting-of-the-german-society-for-clinical-neurophysiology-and-functional-imaging

12th World Congress on Controversies in Neurology (CONy)

22–25 March 2018
Warsaw, Poland
CONy 2018 Website: http://www.comtecmed.com/cony/2018/

2018 ILAE British Chapter Epilepsy Neuroimaging Course

22–24 March 2018
London and Chalfont St Peters, UK
Course website, registration: https://www.eventbrite.co.uk/e/the-2018-ilae-british-chapter-epilepsy-neuroimaging-teaching-course-registration-37941683597

EEG in the First Two Years of Life, from Neonate to Toddler

4–7 April 2018
Cambridge, UK
Information: https://www.ilae.org/congresses/eeg-in-the-first-two-years-of-life

2nd International Training Course on Neuropsychology in Epilepsy

15–20 April 2018
Provence, France
Information: http://www.ilae.org/Visitors/Congress/congressinfo/Neuropsych-in-Epilepsy-2018.pdf

31st International Congress of Clinical Neurophysiology (ICCN) of the International Federation of Clinical Neurophysiology (IFCN)

1–6 May 2018
Washington, DC, USA
ICCN 2018 Website: http://iccn2018.acns.org/

4th International Congress on Epilepsy, Brain & Mind

2–5 May 2018
Brno, Czech Republic
Website: http://www.epilepsy-brain-mind2018.eu/

EILAT Conference on New Antiepileptic Drugs and Devices (EILAT XIV)

13–16 May 2018
Madrid, Spain
Website: https://www.eilatxiv.com/

8th Congress of the Polish Society of Epileptology

17–19 May 2018
Warsaw, Poland

Infantile epilepsy in light of new ILAE classification – new terminology, etiology and treatment perspectives

28 May 2018
Tbilisi, Georgia
Information: https://www.ilae.org/congresses/infantile-epilepsy-in-light-of-new-ilae-classification-new-terminology-etiology-and-treatment-perspectives

30th Annual Meeting of the European Academy of Childhood Disability (EACD)

28–31 May 2018
Tbilisi, Georgia
Information: https://www.ilae.org/congresses/30th-annual-meeting-of-the-european-academy-of-childhood-disability-eacd

Joint Annual Meeting of the Swiss League Against Epilepsy and the Swiss Society of Clinical Neurophysiology

30–31 May 2018
Aarau, Switzerland
Website: http://www.sgkn-congress.ch/

4th East European Course on Epilepsy

13 June 2018
Shishkinn, Chernihiv Region, Ukraine
Website: http://ulae.org.ua/index.php/uk/

54th Annual Meeting of the German Society of Epileptology (DGfE) e. V.

13–16 June 2018
Stadthalle Fürth
Rosenstraße 50 • 90762 Fürth, Germany
Website: http://www.epilepsie-tagung.de/

12th Asian and Oceanian Epilepsy Congress

28 June–1 July 2018
Bali, Indonesia
Website: www.epilepsybali2018.org

4th Dianalund Summer School on EEG and Epilepsy

15–21 July 2018
Dianalund, Denmark
Application and Announcement: https://www.ilae.org/congresses/4th-dianalund-summer-school-on-eeg-and-epilepsy

16th Advanced San Servolo Epilepsy Course

16–27 July 2018
San Servolo (Venice), Italy
Application and Announcement: https://www.ilae.org/congresses/16th-advanced-san-servolo-epilepsy-course

8th International Summer School for Neuropathology and Epilepsy Surgery

26–29 July 2018
Erlangen, Germany
Information: https://www.ilae.org/congresses/8th-international-summer-school-for-neuropathology-and-epilepsy-surgery-ines-2018

12th Baltic Sea Summer School on Epilepsy

24–29 June 2018
Vilnius, Lithuania
Website: http://www.epilepsiestiftung-wolf.de/index.html" www.epilepsiestiftung-wolf.de

4th Summer School on Imaging in Epilepsy: SuSIE 2018

8–12 August 2018
Rauischholzhausen Castle, Marburg, Germany
Website: http://www.imaging-in-epilepsy.org/

13th European Congress on Epileptology

26–30 August 2018
Vienna, Austria
Website: www.epilepsyvienna2018.org

International Symposium on Severe Infantile Epilepsies: Old and New Treatments (ISSET 2018)

20–22 September 2018
Vatican City, Rome, Italy
Website: http://www.ptsroma.it/isset2018/

CLAE/LCCE 2018 Scientific Meeting

21–23 September 2018
St. John's, Newfoundland
Website: https://canadianleagueagainstepilepsy.wildapricot.org/page-1816302

10th Latin American Congress on Epilepsy

29 September–2 October 2018
San José, Costa Rica
Website: http://epilepsysanjose2018.org/

6th Global Symposium on Ketogenic Therapies for Neurological Disorders: Embracing Diversity, Global Implementation and Individualized Care

5–8 October 2018
Jeju, Korea
Website: www.ketoconnect.org

Annual Meeting of the Austrian and German Societies for Epileptology and the Swiss Epilepsy League ("Dreilaendertagung")

8–11 May 2019
Basel, Switzerland
Website: www.epi.ch/fach

33rd International Epilepsy Congress

22–26 June 2019
Bangkok, Thailand