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The Added Value of Neuroimaging for Diagnosing Dementia

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The Importance of Neuroradiologist Authorship in Nonspecialty Journals

Recently an article was published in the *New England Journal of Medicine* entitled ''Imaging the Brain'' (1). The article, written by a neurologist, summarized the topic in 20 pages. A neurologist was the sole author; no neuroradiologists were coauthors. More recently an article was published in the *Journal of the American Medical Association* (*JAMA*) entitled ''Cranial Computed Tomography Interpretaion in Acute Stroke'' (2). Again, no neuroradiologists were involved in the study.

Should neuroradiologists be concerned about not being primarily involved in articles about two core neuroradiology subjects such as brain imaging and CT interpretations? Some would answer, ''No, don't bother. Dissemination of information about our specialty to the readership of two major U.S. nonspecialty journals is commendable, and it doesn't matter who the authors are.''

The editor of a journal is not concerned about the author's specialty, but is primarily concerned about a topic's scientific content, validity, accuracy, applicability, and appropriateness for the journal's readers. Some journal editors may invite such papers from nonneuroradiologists. The editors of the *New England Journal of Medicine* and *JAMA* no doubt had little or no concern about the lack of neuroradiologist authors of the two articles. That lack, however, should be our concern. Our image as the prime directors of neuroimaging has been compromised by the absence of a neuroradiologist as author.

Many articles published in neurology and neurosurgery journals are of neuroradiologic interest but are often published without a neuroradiologist as author or coauthor. I agree that the lack of neuroradiologist contributions in articles in these journals is not as harmful to our image as the lack of neuroradiologist contributions in articles read by the general medical public.

Why is this so? Neurologists and neurosurgeons are aware of our value as neuroimagers, and will continue to consult us, as always, whether or not we are coauthors or authors of papers published in their journals. Nonetheless, when a neuroradiologic topic, written by a neurologist, is published in journals directed at the general medical community such as the *New England Journal of Medicine* or *JAMA*, that community may identify that topic with the authors. Then they may turn to the neurologist for help when in need of neuroimaging to solve a clinical problem.

What can we do about this? It is our role to inform our nonneurologic and nonneurosurgical colleagues about our specialty's clinical applicability. Neuroradiologic content, as published in the leading neuroradiologic and radiologic journals in the U.S., centers on applied technology to image quality and our consequent ability to image different diseases. Increasingly we have been encouraged to carry out cost-analysis studies, and publication of such studies has begun to appear slowly in our journals. Such research is commendable, and while state-of-the-art neuroradiology papers should continue to be published in journals such as the *AJNR*, we must not forget the need to inform our clinical colleagues of our specialty through reviews in clinical publications such as the *New England Journal of Medicine* and *JAMA*. Because subjects as general as ''Imaging the Brain'' have been accepted by general medical journals, the editors of these journals believe that there is a need to disseminate this information to their readers. If that is so, let us be aware of this need and be the leaders in educating our colleagues.

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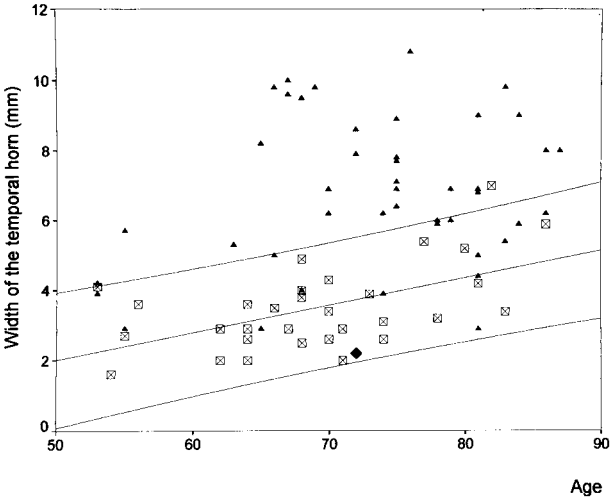
References

1. Gilman S. **Imaging the Brain.** *N Engl J Med* 1998;338:812–820, 889–895
2. Shriger DL, Kalafut M, Starkman S, et al. **Cranial computed tomography interpretation in acute stroke. Physician accuracy in determining eligibility for thrombolytic therapy.** *JAMA* 1998; 279:1293–1297

The Added Value of Neuroimaging for Diagnosing Dementia

Neuroimaging examinations (CT or MR) are often performed for diagnosing dementia. Films are usually evaluated by qualitative visual inspection. Nonetheless, the added value of neuroimaging in the dementia workup is unclear, and studies of its cost-effectiveness are lacking. An official document issued by the American Academy of Neurology, based on the revision of over 1800 research studies, concluded that CT and MR should be regarded as ''options'' in the diagnosis of dementia, ie, they can be considered in ''certain clinical situations'' (1). Lumbar puncture and EEG shared the same rating of recommendation. Furthermore, in a specialized setting it has been shown recently that the diagnostic accuracy of dementia was improved to a small degree (5–10%) by laboratory examinations and qualitative assessment of CT and MR (2). Given the comparable increase of accuracy and the significantly different cost of the two kinds of examinations, the analysis casts a shadow of doubt on the cost-effectiveness of neuroradiologic evaluation of dementia. We wish to describe a patient in whom neuroimaging of brain atrophy added important clinical information to clinical and laboratory examinations.



The graph above depicts the range of medial temporal lobe atrophy (width of the temporal horn) in our patient (*diamond*), 45 Alzheimer's patients (*triangles*), and 31 controls (*squares*). The regression line and 95% confidence intervals for controls are shown.

A 76-year-old woman was referred to our Alzheimer's unit with a history of forgetfulness. The patient was otherwise in good health. Memory loss began 2 years earlier, and progressed to disorientation and disability in daily activities (eg, taking medication, shopping, cooking, doing laundry). Her Mini-Mental State Examination, a measure of cognitive performance, was 23/30 (normal values are above 24). Neurologic examination showed no signs of a focal lesion. The CT scan was normal. Blood studies were all normal including free T_3 and T_4, but her thyrotropin (TSH) levels were in the high range of normal (4.42 μIU/L; normal values: 0.5–5.0 μIU/L). Her neuropsychological pattern of impairment was consistent with Alzheimer's disease (poor ability in copying figures, poor recent episodic memory, preserved autobiographical memory, poor judgment). The patient was given a diagnosis of probable Alzheimer's disease according to current clinical criteria (eg, standards of Alzheimer's Disease and Related Disorders Association), and was entered into an ongoing study aimed at the quantification of brain atrophy with simple linear indices taken from conventional MR examinations (3). When our patient was compared to probable Alzheimer's patients and control subjects, it became obvious that she had medial temporal lobe atrophy indices well in the control range (Fig). The high sensitivity of the patient's medial temporal lobe atrophy on MR images prompted us to reconsider the case, and the patient was contacted for follow-up 12 months after initial MR imaging.

The patient's cognition and daily function had further declined. Her Mini-Mental State score was 18/30, and most of her neuropsychological functions had significantly deteriorated. TSH levels were clearly elevated (6.45 μIU/L), although thyroid hormones were again normal. This condition is known as subclinical hypothyroidism because symptoms of hypothyroidism are usually absent, but associated cognitive deterioration has been reported (4). A serum antithyroid antibody was administered in our patient, indicating an autoimmune thyroid disorder. Replacement therapy with levothyroxine was started at 25–100 μg daily. The patient was seen yearly for the following 3 years, and her Mini-Mental State Score rose to 22, 26, and 27. Her disability was alleviated gradually. The final diagnosis was dementia arising from hypothyroidism. On her last examination, neuropsychological tests were all within normal limits, daily function had fully recovered, and the patient complained only of mild subjective memory disturbance.

The cost-effectiveness of medical testing is receiving increased attention in the clinical literature (5), and the favorable cost-effectiveness of neuroradiologic procedures in some clinical conditions has been shown recently in adolescent psychosis, hearing loss, and in patients with equivocal neurologic symptoms. Despite their widespread use, the cost-effectiveness of neuroimaging examinations of dementia has, to our knowledge, never been demonstrated. Although it is obviously impossible to generalize our observation in this single patient, we believe that the case exemplifies how, in routine dementia assessment, the additional information conferred by neuroimaging can add significantly to patient workup. In our patient, the quantification of atrophy by MR imaging did indeed provide crucial information that other investigations had failed to provide, leading to a radical change in treatment and prognosis.

We believe that researchers in this field should place more emphasis on the evaluation of how much more information neuroimaging can give in addition to clinical and laboratory examinations. Such data are crucial for demonstrating the cost-effectiveness of neuroimaging procedures in the diagnosis and treatment of dementia.

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References

1. Report of the Quality Standards Subcommittee of the American Academy of Neurology. **Practice parameters for diagnosis and evaluation of dementia.** *Neurology* 1994;44:2203–2206

2. Chui H, Zhang Q. **Evaluation of dementia: a systematic study of the usefulness of the American Academy of Neurology's practice parameters.** *Neurology* 1997;49:925–935
3. Frisoni GB, Beltramello A, Weiss C, Geroldi C, Bianchetti A, Trabucchi M. **Linear measures of atrophy in Alzheimer's disease.** *AJNR Am J Neuroradiol* 1996;17:913–923
4. Ganguli M, Burmeister LA, Seaberg EC, Belle S, DeKosky ST. **Association between dementia and elevated TSH: a community-based study.** *Biol Psych* 1996;40:714–725
5. Russell LB, Gold MR, Siegel JE, Daniels N, Weinstein MC. **The role of cost-effectiveness analysis in health and medicine. Panel on cost-effectiveness in health and medicine.** *JAMA* 1996;276: 1172–1177

Heterotopic Neural Tissue in the Dural Sinus: More Frequent than Usually Assumed?

We read with great interest the article by Kollar et al (1) describing the presence of heterotopic brain tissue in the transverse sinus with a concomitant dural fistula. We would strongly support the view that not all structures found within the dural sinuses are in fact arachnoid granulations as assumed by some authors (2, 3). We would like to direct *AJNR* readers to a case of increased intracranial pressure caused by an intrasinusal cystic structure which was surgically removed and histologically examined (4). As in the case of Kollar et al, we found heterotopic nervous tissue in the wall of a cyst. It was termed ''hamartoma'' in our article, and therefore may have escaped these authors' notice during their search of the literature. The lack of histologic evidence of the nature of intrasinusal structures is understandable because of the risk of surgically opening the sinus and the paucity of clinical symptoms in the majority of cases. We would, however, suggest that these structures be called what they are, lesions of unknown origin, rather than arachnoid granulations. Many cases in which histologic evidence could be attained yield arachnoid tissue findings (1).

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References

1. Kollar C, Johnston I, Parker G, Harper C. **Dural arteriovenous fistula in association with heterotopic brain nodule in the transverse sinus.** *AJNR Am J Neuroradiol* 1998;19:1126–1128
2. Roche J, Warner D. **Arachnoid granulations in the transverse and sigmoid sinuses: CT, MR, and MR angiographic appearance of a normal anatomic variation.** *AJNR Am J Neuroradiol* 1996;17:677–683
3. Mamourian AC, Towfighi J. **MR of giant arachnoid granulation: a normal variant presenting as a mass within the dural venous sinus.** *AJNR Am J Neuroradiol* 1995;16(Suppl):901–904
4. Kuker W, Mull M, Mayfrank L, Weis J, Schiefe J, Thron A. **A cystic lesion within the dural sinuses: a rare cause of increased intracranial pressure.** *Neuroradiology* 1997;39:132–135

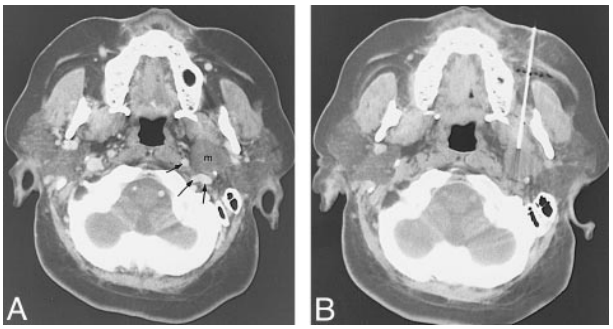
Transbuccal Space Deep Parotid Biopsy

We read with interest the article by Tu et al (1) in the April 1998 issue of the *AJNR* regarding the buccal space as a safe route for the performance of biopsy within the parapharyngeal region. In the article, the authors mention that CT guidance for biopsy of other deep-seated infratemporal masses, including the parotid space, has been reported. Nonetheless, the studies that were referenced with respect to such CT-guided biopsies (2, 3) appear to describe CT-guided parotid lesion biopsy only via a direct transparotid approach. In a related study (4), CT was not used to guide parotid lesion aspiration.

A patient was referred to us recently from an ENT clinic for biopsy of a deep parotid mass. This 43-year-old woman had undergone MR imaging for what was ultimately diagnosed as corticosteroid-dependent optic neuropathy. That MR study showed an incidental 2.5-cm mass in the region of the deep portion of the left parotid gland. Using a coaxial technique, we obtained biopsies of this lesion via the buccal space with CT guidance (Fig) without complication.

Although we could have acquired a biopsy of the mass from a lateral approach via a transparotid route, we decided to obtain a tissue sample via the transbuccal space to eliminate the possibility of injuring intraparotid branches of the facial nerve and avoid damaging the nearby carotid sheath vasculature that such a transparotid approach could entail.

We agree that the transbuccal space route for aspiration/biopsy of deep infratemporal fossa masses



Axial CT scan during contrast administration (*A*) shows a low-attenuation mass (*m*) in the deep parotid space, and enhancing carotid sheath vasculature (*arrows*). A 19-gauge needle was placed through the buccal space with its tip at the anterior aspect of the mass (*B*). Multiple fine-needle aspirations were then performed by passing 22-gauge needles through the 19-gauge needle into the mass. An on-site pathologist made the diagnosis of pleomorphic adenoma, which was confirmed at surgery 6 months later.

should not only be a relatively safe route for evaluating masses arising in the parapharyngeal region, but also for evaluating masses in the deeper portion of the parotid space and in the parapharyngeal fat space. In some cases, deep masticator space and possibly anterior carotid space lesions may also be amenable to such evaluation though we have not performed any such biopsies. All such lesions, however, initially should be evaluated with dynamic contrast-enhanced CT scanning to localize major vascular structures definitively and determine the safest route for biopsy that may or may not be through the buccal space. Surveillance CT scanning during needle placement is also necessary to monitor needle position and confirm ultimate intralesional needle placement.

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References

1. Tu AS, Geyer CA, Mancall AC, Baker RA. **The buccal space: a doorway for percutaneous CT-guided biopsy of the parapharyngeal region.** *AJNR Am J Neuroradiol* 1998;19:728–731
2. Ljung BME, Larsson SG, Hanafee W. **CT-guided aspiration cytologic examination in head and neck lesions.** *Arch Otolaryngol* 1984;110:604–607
3. Cameron RH, Mann CH. **Fine needle aspiration and CT scanning in the evaluation of parotid lesions.** *ENT J* 1989;68:226–236
4. Berg HM, Jacobs JB, Kaufman D, Reede DL. **Correlation of fine needle aspiration biopsy and CT scanning of parotid masses.** *Laryngoscope* 1986;96:1357–1362