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### **Lymphoma: master of chicanery.**

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## Lymphoma: Master of Chicanery

Lymphoma is a disease with many faces. It seems as if lymphoma is a diagnostic possibility that can, should, or is tagged onto the end of the differential diagnosis in a surprisingly large number of circumstances. Clearly, Chong et al have presented one of these situations in their case report in this issue of the *American Journal of Neuroradiology* (page 1849). An infiltrating mass in the masticator space, with the mandible excluded as a source, in an otherwise healthy patient is far more likely to be a sarcoma (even in an adult), but up pops lymphoma in an appropriate list of differential possibilities.

This case report raises some important practical points in approaching the workup of such mass lesions in the head and neck region, including the following:

1. Whenever an infiltrating mass is present in the extracranial head and neck region, lymphoma is a possible cause, even in the absence of regional adenopathy or other sites of disease.

2. If lymphoma is in the differential diagnosis, so is pseudotumor and sometimes eosinophilic granuloma and Wegener granulomatosis. Even chronic infections with organisms as diverse as blastomycosis and actinomycosis need to be considered when this pattern of disease is present.

3. If lymphoma is the diagnosis, it is almost certainly non-Hodgkin and there is a strong possibility of disease elsewhere in the body requiring an appropriate search for other disease sites.

4. Signal intensity and enhancement patterns present on various pulse sequences are not reliable for distinguishing lymphoma from other malignant neoplasms and from other pathologic processes that may spread in the same anatomic pattern. Tissue sampling in an environment that anticipates lymphoma as a diagnostic possibility is the most efficient path to accurate diagnosis.

5. If the mass is being sampled under imaging guidance and the initial sample shows that lymphoma is likely, several core needle samples should be obtained to save the patient a second needle biopsy or difficult open biopsy, since these masses are often relatively inaccessible by standard surgical approaches.

The inaccessibility mentioned above emphasizes other common sites of origin for this uncommon problem, including the parapharyngeal, retropharyn-

geal, and buccal spaces as well as the skull base and its immediate environs. The variety in possible sites of origin then predicts that presenting signs and symptoms will be equally diverse. TMJ dysfunction, various cranial neuropathies, dysphagia, otalgia, and a palpable or visible mass are only a few presenting symptoms and signs that, in my experience, eventually proved to be due to lymphoma.

Perhaps one of the more important considerations in the presenting symptoms just listed is that of cranial neuropathy, since the imaging findings can sometimes be subtle. Lymphoma may be "neurotropic," producing only a thickened or enlarged appearance of the lower cranial nerves, which can be traced intracranially when there is continued enlargement of the involved nerves without associated meningeal disease. Once seen, this pattern is hard to forget, and it can lead to a rapid disposition for the patient in what otherwise would prove to be a perplexing and prolonged evaluation.

The more common presentation of lymphoma in the extracranial head and neck is, of course, nodal disease, but even this may be atypical. An isolated mass anterior to the canine fossa of the maxilla is likely to be lymphoma arising in the infraorbital lymph node. This is part of the little-known facial lymph node group that might also be the site of origin or involvement of lymphoma arising over the malar eminence (zygomatic node), in the buccal space (buccal nodes), and along the mandible (mandibular node).

Nodes arising in the more standard parotid and cervical groups must be distinguished from reactive adenopathy and metastases from other malignant lesions. Imaging in these instances may help the clinician to choose the node most accessible for safe, total, excisional biopsy whenever necessary. Whenever nodal disease is present, a search for involvement of extranodal sites is mandatory, and the scanning protocol for the head and neck region must include the orbits (lacrimal glands), Waldeyer's ring, and the entire neck through and including the thyroid gland and nodes in the supraclavicular fossa. This search must include a careful viewing of bone and soft tissues as well as the epidural space and those intracranial structures that happen to be included.

The essence of a good head and neck oncologic imaging examination is a combination of excellent-

quality images and an understanding of the natural history of the disease confronting the patient. Proper protocols must ensure areas of coverage for lymphoma, including all the areas of probable involvement, with images of adequate spatial resolution (in general, section thickness not to exceed 3 to 4 mm and field of view not to exceed 16 to 18 cm) and with the viewing of images at appropriate window settings. With the use of a good technique, thoughtful inter-

pretation, and consultation with our clinical colleagues, we cannot help but deliver more effective diagnoses and management of patients with lymphoma and other malignant processes in the head and neck region.

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## Neonatal MR Imaging: Achieving Our Own Expectations

For the past decade our anticipation has been that MR technology would facilitate the differentiation of congenital from acquired brain abnormalities and the distinction between patterns and timing of CNS damage as it relates to toxic and metabolic insults. We have expected that this information would eventually allow us to optimize treatment of individual children or groups of children. In partial response to these expectations, Aida et al, in this issue of the *American Journal of Neuroradiology*, have added to the wealth of published material relating to the use of MR technology for the characterization of human perinatal CNS abnormalities (page 1909).

Significant challenges exist, however, relative to this literature and relative to the use of such data for the characterization of long-term clinical outcome. First, as these authors note in their introductory paragraph, the prediction of outcome based on clinical data "is difficult because of the inability to determine the severity, timing, tempo, and duration of the insult." There has been little such recognition that it is challenging for the clinician or researcher to define the very existence of perinatal asphyxia, much less its severity, timing, duration, or cause (1, 2). Despite this handicap, asphyxia is often addressed as the default process causing MR abnormalities and therefore any subsequent neurologic dysfunction. The NIH consensus definition of "acute perinatal asphyxia" requires a combination of a 5-minute Apgar score of less than or equal to 3, hypercapnia, hypoxemia, and an umbilical cord pH of less than 7.0. Damage to the brain and other organs appears to require the presence of diminished organ perfusion. Symptoms of coma, lethargy with hypotonia, poor feeding, seizures, and respiratory depression are generally associated, and develop within 12 to 24 hours of such an insult. These clinical findings are not, however, specific for hypoxic-ischemic encephalopathy, and they cannot be used alone to define the presence of such a process.

Relating to the eventual development of cerebral palsy, the NIH perinatal collaborative study indicated that predilection for cerebral palsy does not increase until Apgar scores are 3 or lower for longer than 15 minutes. The majority of neonates with biochemical evidence of acidemia will not incur neurologic sequelae. Additionally, Apgar scores at 1 and 5 minutes

are not, alone, predictive of the presence of asphyxia or of the development of subsequent neurologic dysfunction. It would be useful if manuscripts relating to neonatal MR findings would more fully characterize clinical and laboratory data relating to the subjects being reported, for without such data it is impossible to state whether the imaging alteration described relates to perinatal asphyxia or to separate or associated processes.

Second, the literature relative to MR findings in suspected perinatal asphyxia consists almost entirely of descriptive studies, meaning that it is based on nonrandomly selected single or group observations, without control subjects. While these studies may have provided us with a subjective feeling of comfort regarding the meaning of various patterns of MR alterations in the newborn brain, observational case-control or prospective cohort investigations using MR studies performed in sequential or randomly chosen subjects are clearly needed for hypothesis testing. If a sample chosen for study includes only those subjects with abnormal MR examinations, it will not be possible to characterize the predictive value of MR findings relative to the occurrence of normal or abnormal development. The clinical effectiveness, for diagnostic and predictive purposes, of MR imaging in the neonate needs to be more appropriately assessed.

A third difficulty relates to attempts to correlate late clinical outcome with findings on neonatal MR images. Conclusions to date have generally been based on periods of follow-up that are insufficient in duration. A normal neurologic examination in a 1-year-old child is not satisfactorily predictive of continued normal motor skills, language, or cognitive function; and psychological tests of intelligence administered at 1 year can be only grossly predictive of eventual function. Conversely, signs of spastic diplegia at age 1 year will usually resolve by age 7 years. Long-term follow-up evaluation, including clinical, psychometric, school performance, and behavioral assessment, is needed before normal or abnormal MR findings can be said to relate to late or long-term function.

Pulse sequence selection for use in the neonatal brain also needs to be addressed. Standard "adult" section thickness and skip factors, and standard TR