ORBIT TUMORAL PATHOLOGY - ULTRASOUND DIFFERENTIAL DIAGNOSIS

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Abstract: *The diagnosis value of the ultrasound investigation in the orbit pathology is materialized in the capacity of elucidating the inflammatory, endocrine or tumoral etiology, being a major criterion in the adoption of the therapeutic approach. When evaluating the tumoral pathology, echography is seen, both as an investigation of first intention – having as a purpose the screening orientation of the subsequent investigations – and as a method to differentiate the tumoral histologic structure, based on their ultrasonic character. The correlation of the ultrasound data with the information supplied by other imagistic methods represents elements that reduce the rate of the diagnosis error at maximum.*

Keywords: *ultrasonography, orbit, tumours*

Rezumat: *Valoarea diagnostică a ultrasonografiei în patologia orbitară, se concretizează în elucidarea etiologiei inflamatorie, endocrină sau tumorală, criteriu decisiv în stabilirea conduitei terapeutice. În patologia tumorală, ecografia se remarcă atât ca investigaţie de primă intenţie – având ca scop orientarea screening-ului investigaţiilor ulterioare – cât şi ca metodă de diferenţiere a structurii histologice tumorale, pe baza caracterului lor acustic. Corelarea datelor ultrasonografice cu informaţiile furnizate de alte metode imagistice, constituie elemente ce au redus la maxim rata erorilor de diagnostic.*

Cuvinte cheie: *ultrasonografie, orbită, tumori*

Ultrasound exploration of the orbit represents a priority indication of the echographic examination. The diagnosis value is materialized in the capacity of elucidating the inflammatory, endocrine or tumoral etiology , being a major criterion in the adoption of the therapeutic plan.

When evaluating the tumoral pathology, echography is seen, both as an investigation of first intention and as a method to differentiate the tumoral structure, based on their ultrasonic character.

Ultrasound differential diagnosis criteria:

- **Reflectivity**. The most echogenous structures are the cavernous angiomas of the orbit, followed by the tumours of solid or dense type.
- **Attenuation** - appreciated by:
  - the decrease of the intensity of the echoes during the penetration of the ultrasound
  - fascicle
  - the occurrence of the orbit shadow.
- **Reducibility :**
  - specific for the cystic structures
  - is studied by compressing the examined structure against a wall of the orbit.
- **Homogeneity**. The dense and liquid structures are usually homogenous, but they present a different level of reflectivity.(7) The cavernous angiomas, haematomas and certain inflammatory pseudotumours are heterogeneous.

The regular or irregular character of the detected structure limits:

- the irregular character of the limits is one of the characteristics of certain tumours
- regarded as infiltrating (liposarcomas).
- a less clear limit is characteristic for an inflammatory pseudotumour.

The echographic classification of the orbit tumours:

- Heterogeneous structures
- Homogenous, dense, reflecting structures
- Liquidian structures.

Tumours with heterogeneous structures

Are defined by an intensely echogenous character.

- Cavernous angiomas are strongly echogenous structures, slightly reducible, with echoes that decrease rapidly in their depth. They may be mobile – when they are placed inside the muscle cone – and immobile – when they are placed extraconically. The examination by compression may produce an indentation of the tumoral echographic image at the level of the posterior sleral echo.(2)
- Recent orbit haematomas may present a heterogeneous echographic aspect.
- Orbit abscess presents irregular limits and a heterogeneous structure.

Tumours with homogenous dense structure

Are slightly echogenous:

1. orbital primitive tumours
2. inflammatory pseudotumours;

3. tumours of the lacrimal glands;
4. metastatic tumours;
5. invasive tumours;

1. *The primitive tumours:*
   - rabdomyosarcoma;
   - lymphoma;
   - plasmacytoma;
   - optic nerve tumours;

They are mildly echogenous, usually irreducible and with variable limits.(8) (Picture no. 1.)

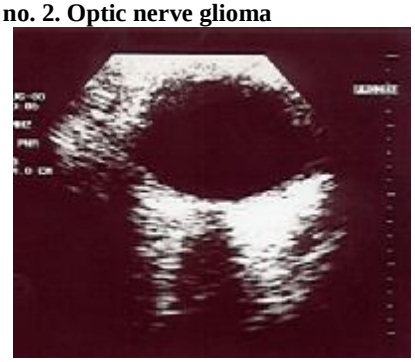
- Orbit lymphomas present :
  - irregular shape;
  - homogenous structure;
  - high acoustic absorption;
  - no "internal reflexes" inside the tumour;

Picture no.1. Primitive orbit tumour

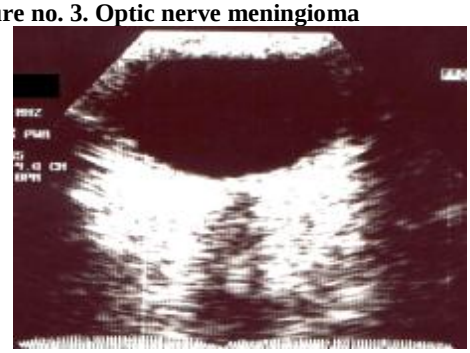
- The tumours of the optic nerve(glioma) are weakly echogenous, in comparison with the tumours of the menginomas, which are heterogeneous and present an increased reflectivity.(1)

Optic nerve glioma is echographycally viewed as a weakly homogenous gap, with dull lines, which increases the image of the optic nerve. (Picture no.2.)
Meningiomas present an echographic image well delimited by the surrounding orbit tissue (Picture no. 3). The echographic aspect is also characterized by the presence of certain dispersed echoes, with low reflectivity, that represents the phenomenon of "internal reflexes" generated by acoustic discontinuities from inside the tumour. These acoustic discontinuities are due to the histologic structure of the tumour that presents reflecting interfaces between the planes of the tumoral cells, conjunctive septal tissue and blood vessels inside the tumoral tissue.(5)

Picture no. 2. Optic nerve glioma



Picture no. 3. Optic nerve meningioma



2. *The inflammatory pseudotumours* present irregular limits and a sort of heterogeneity.(9)
3. *The tumours of the lacrimal gland* are less echogenous and well delimitated.
4. *Orbit metastatic tumours* present acoustic characteristics similar with those of the primitive tumours, but less reflecting, irregular and infiltrating.(3) (Picture no. 4.)

Picture no 4. Metastatic tumour

Tumours with homogenous cystic structure

Diagnosis acoustic criteria (Picture no. 5):

- decreased or absent reflectivity;
- compressible;
- net delimitation;
- homogenous.

Picture no. 5. Orbit tumour with cystic structure

These echographic characteristics must be nuanced according to the nature of the structure:

- orbit mucocele present a homogenous aspect, well

delimitated, with reduced or average reflectivity, incompressible.(7)

- dermoid cystic is presented as a non homogenous structure with tissue density.
- Orbit varices present reduced reflectivity, homogenous internal structure and weak sonic attenuation.
- Arterial-venous malformations present reduced reflectivity, regular internal structure, weak sonic attenuation.(4) Kinetic and Doppler ultrasonography echography suggest the presence of a strong vascularization and the increase of the venous volume.
- The collected hematoma:
  - in a recent stage, the aspect is heterogeneous.
  - in collected stage, it may present an irregular reflectivity.

Echography should not be interpreted in a competitive context with other investigation techniques, but only in the context of the mutual information completion, leading to the elucidation of the diagnosis.

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