Cytology as a tool in diagnosis of Toxoplasmosis

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INTRODUCTION

• Toxoplasmosis: one of the commonest parasitic infections worldwide
• Caused by protozoa Toxoplasma gondii.¹
• Usually diagnosed by serology.
• Cytological techniques are rarely used for identification of the organisms.²,³
• We report 3 cases, in which various cytological methods helped in
• revealing the diagnosis as well as identifying the organism directly.
CASE - 1

• A 46-year-old woman presented with fever, cough and right sided cervical lymphadenopathy for 2 months duration.
• Physical examination revealed an enlarged lymph node in the right posterior triangle, measuring 1.5 cm in diameter.
• FNAC was performed
• FNAC showed reactive lymphoid hyperplasia with an ill-formed microgranuloma

• A large *spherical cyst*, containing numerous *bradyzoites*

• Suggestive of toxoplasma lymphadenitis.

• Serology showed elevated levels of IgM.
REACTIVE LYMPHOID HYPERPLASIA
MICROGRANULOMAS
CYST WITH BRADYZOITES – tissue cyst
CASE -2

• A 6-year-old girl presented with fever since 1 month, not responding to antibiotics.
• Lately, she was irritable and had features of meningitis.
• The tap yielded 0.3 ml of hazy CSF with the cell count of 8 cells/cumm & predominance of neutrophils.
• The CSF protein 36.9mg/dl & glucose was & 67mg/dl.
• CSF showed numerous conical shaped bradyzoites scattered throughout the slides.
• India ink was negative.
• Her HIV & HBsAg status was negative.
CONICAL SHAPED BRADYZOITES
CONICAL SHAPED BRADYZOITITES
CONICAL SHAPED BRADYZOITES
CASE - 3

• A 59-year-old man, c/o RVD non adherent to treatment, came with the complaints of vomiting, loose stools and abdominal pain.

• He also had anemia, leucopenia with elevated ESR.

• CT abdomen $\rightarrow$ dilation of common bile duct and intrahepatic biliary radicals.
CT abdomen

Dilation of common bile duct and intrahepatic biliary radicals.
CT abdomen

Dilation of common bile duct and intrahepatic biliary radicals
• He was positive for HBsAg. His CD4 count is 157/cumm & viral load was 142277copies/ml.
• ERCP was done.
• Biliary brushing cytology revealed numerous crescent shaped tachyzoites with occasional tissue cyst suggestive of toxoplasmosis.
Crescent shaped tachyzoites with bile duct cells
Crescent shaped tachyzoites
CONCLUSION

• Toxoplasmosis is a zoonotic infection in humans.
• Exists in the environment in three forms: tachyzoite, bradyzoite (tissue cyst), oocyst.  
• Majority of toxoplasma cases seen in immunocompetent hosts are subclinical/asymptomatic,
• In immunocompromised hosts and in congenitally infected newborns → severe symptomatology like
  - encephalitis,
  - chorioretinitis,
  - pneumonia,
  - myocarditis etc.\textsuperscript{5}
• Rare presentation of toxoplasmosis like disseminated toxoplasmosis, toxoplasma pneumonitis, isolated lymphadenopathy, PUO etc. are reported

• Toxoplasma tachyzoites/bradyzoites have been isolated from CSF, amniotic fluid, BAL fluid etc.\textsuperscript{6}
• This report highlights the utility of cytological methods in identification of the organism in 3 rare cases.

• 1. **FNAC** is a valuable tool for the diagnosis of toxoplasma lymphadenitis.

• 2. **CSF analysis** is useful in identification of
  - tachyzoites/bradyzoites
  - diagnosis of toxoplasma encephalitis.
3. Biliary brushings - usefulness in the diagnosis of toxoplasmosis

Parasites are one of the important causes of biliary strictures,

To the best of our knowledge this is the first case of finding the organism in biliary brushings.
SYMPTOMS – IN GENERAL

• Body aches
• Swollen lymph nodes
• Headaches
• Fever
• Fatigue

• Symptoms often last for a month or longer.

Source - internet
IMMUNE INCOMPETENT

• Immune incompetent people: HIV or AIDS, individuals undergoing chemotherapy, and the recipients of organ transplants show
• re-activation of a previous infection.
Cont’d

• They develop more severe symptoms such as:
  - Headache
  - Confusion
  - Poor coordination
  - Seizures
  - Lung infections
OCULAR TOXOPLASMOSIS

• Ocular toxoplasmosis can cause the following symptoms in the eye:

  • Decrease in vision
  • Blurry vision
  • Redness
  • Pain, especially when exposed to bright light
  • Tearing

Source - internet
IN PREGNANCY, NEONATE AND CHILDREN

- Pregnant woman gets infection with T. gondii, passes the infection to her newborn infant.
- Infection early in a pregnancy, can result in the loss of the fetus,
- Infants born with the parasite typically have following symptoms:
  - Seizures
  - Spleen enlargement
IN NEONATE AND CHILDREN

- Liver enlargement
- Jaundice
- Severe eye infections

• Most often, babies are asymptomatic at birth. Later may develop symptoms of toxoplasmosis like hearing loss, mental development issues, or eye infections etc.
DIAGNOSIS

• Morphology and serology (IgM antibody)

• PCR and immunostains are usually **negative** in lymph nodes

• High IgG avidity only in patients who developed lymphadenopathy at least 4 months earlier
MORPHOLOGY

• Epithelioid microgranulomas (small clusters of epithelioid histiocytes with abundant, pale staining and homogenous cytoplasm and eccentric, oval nuclei but without necrosis, giant cells or neutrophils) are characteristic

• Background with reactive lymphoid hyperplasia

• Tachyzoites within lymphocytes

• Pap stain may demonstrate parasite on FNA

• 3 forms of parasites:--
  - Tachyzoites $\rightarrow$ most actively dividing form
  - Bradyzoites $\rightarrow$ slowly dividing form
    when in cluster in cyst in tissues – tissue cyst
  - Oocyst $\rightarrow$ contains Sporozoites

VACCINATION

• There is no vaccine against toxoplasmosis yet -----
• Preventive measures should be taken but are not universally applied till now.
• Thus, there is a need for establishing educational programs to increase the awareness of the population regarding risk factors, symptoms and transmission of toxoplasmosis also its preventive measures.

SANITATION AND FOOD SAFETY TIPS

Precaution measures to minimize Toxoplasma infection in order of importance:

• Do not eat raw or under cooked meat.
• Do not eat unwashed fruits and vegetables.
• Do not drink unpasteurized milk.
• Do not drink environmental water that has not been boiled/filtered.

Source - internet
• Do not feed unpasteurized milk or raw meat to cats.
• Wash hands and food preparation surfaces with warm soapy water after handling raw meat.
• Wash hands before eating.
• Wear gloves while gardening and wash hands afterwards.

Source - internet
• Keep sandboxes covered and don’t allow cats to use them litter box.
• Do not allow cats to hunt or roam unsupervised.
• Remove feces from the litter box daily and wash it frequently with boiling water.
• Food should be cooked to safe temperatures.
• Fruits and vegetables should be peeled or thoroughly washed before eating.
• Cutting boards, counters, utensils, and hands should be washed with hot soapy water after contact with raw meat, poultry, seafood, or unwashed fruits or vegetables.

• Trappers should take special caution to minimize their exposure to faeces when trapping and skinning lynx as lynx serves the only wildlife source of Toxoplasma oocysts.

(Rashno M M, Fallahi S, Arab-Mazar Z, Dana H. Seromolecular assess of toxoplasma gondii infection in pregnant women and neonatal umbilical cord blood. EXCLI Journal 2019;18:1-7 )
• Pregnant women should consult obstetricians for specific serologic testing

• Pregnant women and immune-deficient persons should refrain from eating raw meat, should wear gloves during gardening and any contact with soil or sand where cat faeces may be present.
• They should avoid scooping or changing cat litter if possible.
• If not then change the litter, using gloves, then wash hands thoroughly.
• Cat litter boxes should be scooped or changed daily because oocysts require 1-5 days to become infective.

REFERENCES


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