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Microscopic appearance of edible spices as intruders in histopathology

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Abstract

It is common for histopathologists to encounter food particles such as spices entrapped in various biopsy sections. Identification of these remains unresolved as they appear strange, leading to misdiagnosis. This study was a quest to find out the microscopic appearances of such edible intruders. Fourteen spices commonly used were selected and were introduced intentionally into the lung sections after soaking them overnight. They were processed routinely, 4-5 thick paraffin embedded sections were stained with haematoxylin and eosin, were studied under light microscope and polarising microscope. All the spices had different and vivid appearances and were variably birefringent. The present study helped us gain knowledge regarding microscopic appearance of various spices which were included in the study. An image bank of microscopic appearance of all these spices and food particles helps pathologists to avoid misdiagnosis or confusion and helps in definitive diagnosis.

Keywords: Spices, artefact, polarised light, birefringent

1. Introduction

It is common for histopathologists to encounter food particles entrapped in various biopsy sections. Identification of these remains unresolved as they appear strange, which may lead to misdiagnosis. It's a well-known fact that spices are an important ingredient of Indian recipe.

Spices used in India not only add taste and medicinal value to the food, but also cause diagnostic difficulties when entrapped along with food in biopsies of oral cavity, GIT (Gastro Intestinal Tract) etc. Awareness of the health benefits of spices has made people chew them regularly after food. These spices may get impacted in the periapical region of oral cavity or GIT or aspirated in the lungs and found in the microscopic sections. The main objective of the study was to observe the histopathological appearances of few spices that are commonly used by Indians. So that the knowledge thus gained helps to avoid histopathological errors and misdiagnosis

2. Methodology

Fourteen spices most commonly used in food or chewed after meals were selected for the study. Each of them was intentionally introduced into the tissue bit taken from the lung, after they were soaked overnight in water. Tiny incision with the scalpel was made in the tissue bits to introduce these unfixed spices with tissue forceps. After 24 hours of fixation, these tissues were processed routinely. 4-5 μ thickness sections taken from the paraffin blocks were stained with H&E (Haematoxylin and Eosin) and studied in detail under light microscope and polarizing microscope. Microscopic details of these spices were recorded and tabulated.

3. Results

Fourteen spices which were used for the study were black pepper, cardamom (seed and the outer cover), clove, black sesame seeds, white sesame seeds, carom seeds, fenugreek seeds, sonf, poppy seeds, Niger seeds, mustard seeds, garlic, and cumin seeds. Of these, four spices viz. poppy seeds, mustard seeds, cardamom seeds, Niger seeds, were excluded from the study. Poppy seeds and mustard seeds being very tiny were difficult to be retained in the tissue sections during processing. Cardamom was processed after taking out the outer covering. Outer cover was processed separately. Cardamom seeds and Niger seeds were difficult to be cut.

White sesame seeds became slimy and slipped off from the tissue bits, and were reprocessed by introducing them in the bits taken from wall of the myometrium. Hence these four spices were excluded from the study.

The other spices had vivid appearances and their microscopic appearance is as shown in the table (table no 1 and table no 2) All of them were variably birefringent under polarizing microscope.

Table 1: Light microscopy and polarizing microscopy of different spices with their probable misdiagnosis

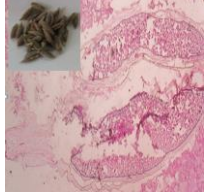
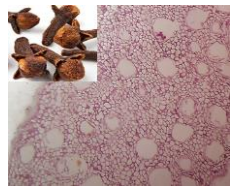
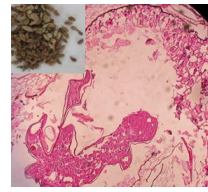
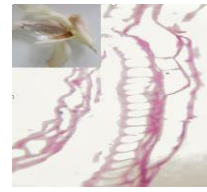
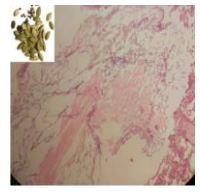
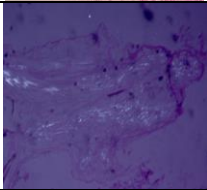
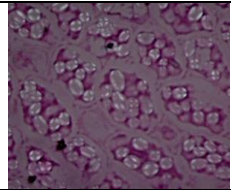
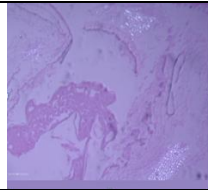
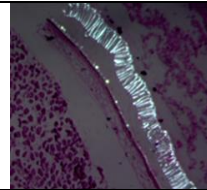
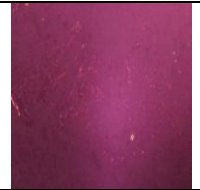
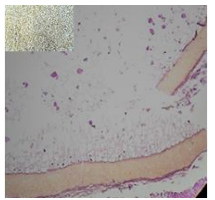
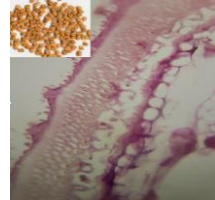

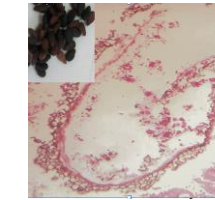
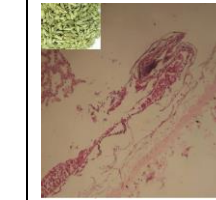
Spices (inset)	a. Cumin seed	b. Clove	c. Carom seeds	d. Garlic	e. Cardamom
Microscopy	Oval shape with stalk	Adipose tissue	Coloured, Looked like a germinating seed. Inner structure appeared like a parasite.	Columnar epithelium	Smooth muscle
Light Microscopy H&E, High power					
Polarizing Microscopy					

Table 2: Light microscopy and polarizing microscopy of different spices with their probable misdiagnosis.

Spices	f. Sesame seeds: white	g. Fenugreek	h. Pepper	i. Sesame seeds (black)	j. Sonf
Microscopy	Thick, yellowish cyst wall	Wall: apocrine pinching	Cyst wall	Cyst wall	Congested vessel
Light Microscopy H&E, High power					

4. Discussion

Food particles are known to appear as artefacts in tissue sections and cause confusion to the pathologists. Artefacts are artificially or accidentally introduced features found in the specimen under study [1]. It is very important to detect them as extraneous to avoid misdiagnosis as they may resemble some tissues. There are only handful of research papers on specific appearances and recognition of these food particles [2]. Food particles can be encountered in the tissue sections obtained in the biopsy specimens of lung, intestine, appendix, perianal region etc. with or without inflammation and foreign body reaction. Pathologists should differentiate them from inflammatory, malignant or other conditions and structures simulating them [2].

Watson *et al.* studied foreign body reactions and the structure of vegetable material commonly impacted in oral cavity by introducing them into subcutaneous tissue of mice. Lentils appeared as large ovoid structures with faint eosinophilic hyalinised covering. Beans and peas appeared like ovoid red globules surrounded by yellow membrane. Apples were basophilic honeycomb like and corn husk exhibited flocculent eosinophilic appearance. Rice and potato chips were structure less. All these food particles had foreign body reactions around them and were confirmed by PAS and fluorescent microscopy [3].

Pulse granuloma or vegetable granuloma by peas or beans occurs due to entrapment of vegetable or plant material into

the periapical region of oral cavity. Such cases were studied by Sowmya *et al.* and the histopathology showed hyaline rings with double layered retractile membrane appearing round or irregular structures enclosing an amorphous material. It was associated with inflammatory infiltrate and foreign body giant cells [4]. Similar study was done by Vijayalaxmi *et al.* and Manjunatha *et al.* where the histopathology of vegetable food material appeared homogenous, pale and eosinophilic with double layered refractile hyaline membrane surrounded by inflammation. It was confirmed by PAS, alcian blue positivity and polarizing microscopy [5, 6].

Yeo Ny *et al.* also reported a case of pulse granuloma in the periapical region of the oral cavity which was diagnosed after histopathological examination of extraneous material. [7] Pritt *et al.* have observed several different vegetarian and nonvegetarian food particles in the airway following aspiration. Wherever the history of aspirated material was available, they compared the features of same with known histopathological pictures. Plant material was easy to be identified because of rigid cell wall; clear areas were seen in the lentils filled with PAS positive material. Striated muscle, bone, cartilage were identified as foreign after taking history. Confirmation and specific identification of foreign body is also important for medico legal purposes [8].

Mary *et al.* studied foreign body reaction to inhalation of lentil soup in their case report. They injected it into the mice

intraperitoneally and subcutaneously. Peas, beans and lentils had capsule with small eosinophilic ovoid bodies which were confirmed by polarizing light by their positive birefringence [9].

In a similar study by Shashikala *et al.* histological appearances and the possible misdiagnosis of various extraneous substances was studied which also included food particles like groundnut, curry leaf, chilli seeds, rice and various grams. The identification of extraneous material was done by polarising microscopy [2].

5. Conclusion

The present study helped us to gain knowledge regarding microscopic appearance of various spices which were included in the study. It appears to be one of the rich resources for the comparison of microscopy of various spices whenever they are encountered in the tissue sections to avoid misdiagnosis. Proper history has to be collected from the clinicians and pathologists should be aware of possibilities of such extraneous material in biopsies, and use additional diagnostic techniques such as special stains and polarizing microscopy to diagnose the exact nature of these food particles. Knowing these puzzling histopathological appearances and the foreign body reactions associated with them, helps in identifying them in cases of autopsy sections of aspiration prone patients.

Further studies are needed incorporating more number of spices and food particles in tissue sections. An image bank of microscopic appearance of all these spices and food particles helps pathologists to avoid misdiagnosis or confusion and helps in definitive diagnosis.

6. References

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