The presence of worms in cytological smears is occasionally reported, although various other structures exist that may be confused with such parasites. We present eight worm-like artifacts observed in routine Papanicolaou smears. Recognition of these structures is important to avoid overvaluation or confusion with true worms. Diagn. Cytopathol. 2006;34:636–639.

Key Words: worms; parasites; artifacts; exfoliative cytology

Introduction

For some time now, references have appeared in the literature reporting the presence of larvae and adult worms in cytology, both conventional and liquid.

The presence of such microorganisms in cytological smears is important, as this finding, although sometimes accidental, may have implications for prognosis and therapy. However, on numerous occasions, the presence of other structures, varied in nature but with similar morphological features, may give rise to confusion and/or incorrect interpretation.

The purpose of this report is to give inexperienced microscopists the morphological criteria required for them to differentiate certain artifacts, regularly observed in smears, from clinically significant parasites.

Materials and Methods

Routine cytological smears from various samples (sputum and cervicovaginal smears) were examined under the microscope. All smears were stained using the Papanicolaou method. Part of this material was used in a cytotecnology school for training purposes.

Results

Cytological Findings

The following artifacts are shown:

1. Curschmann’s spiral in sputum smear (Fig. 1A). This structure appears as a cast of small bronchi and bronchioles from inspissated mucus. A dense central core can be observed, formed principally by proteins and nuclear debris, surrounded by mucus. These spirals are frequently observed in bronchial asthma.

2. Fragment of skeletal muscle fiber in sputum smear (Fig. 1B). In this structure, various nuclei distributed longitudinally can be observed, together with the typical transversal striations. Its presence in sputum smears is usually due to contamination by food in the oral cavity.

3. Ferruginous body in sputum smear (Fig. 1C). It was a long, narrow structure with club-shaped ends, with yellowish deposits of inorganic material (principally an iron-protein pigment) along the whole of its length (segmented morphology or bamboo-shaped). These elements are frequently encountered in the sputa of patients with pneumoconiosis, especially those exposed to asbestos.

4. Plant hair (trichome) in sputum smear (Fig. 1D). One end of the hair is rounded in appearance, while the other is usually tapered. An internal refractile elongated core is also visible.

5. Synthetic fiber in sputum smear (Fig. 2A). Although the two extremes are rounded and do not terminate abruptly, there is no recognizable internal structure. The whole surface is covered by fine dots, characteristic of synthetic fibers such as rayon.

6. Natural fiber in cervicovaginal smear (Fig. 2B). The surface does not show the dotted pattern characteris-
tic of synthetic fibers, but there is a series of lines forming a fringe along the whole of its length, typical of fibers such as cotton.

7. Algae of Cyanophyta class (Oscillatoria sp.) in cervicovaginal smear (Fig. 2C) and sputum smear (Fig. 2D). The first structure is filamentous in shape and is quite wide (60–70 μm in thickness). In the interior, the cells are laid out in a row and are separated by transversal walls. It is enclosed in a gelatinous sheath. The second structure also is filamentous in shape, but is much thinner (4–6 μm in thickness), with slight strangulations on the lateral walls and with rounded ends. Here too, the cells are laid out in a row, separated by fine transversal walls and enclosed in a gelatinous sheath.

**Discussion**

The presence of worms in cytological smears has occasionally been described in the literature, with the identification of various forms corresponding to different stages of the life cycle of the parasite or parts of the same. If only larvae and adult worms are considered, the types most frequently mentioned may well be two filarial species, *Wuchereria bancrofti* and *Loa loa*, and *Strongyloides stercoralis*. Factors such as immunosuppressive state, visits to tropical countries, and immigration favor the presence of these parasites in cytological smears.

To identify worms in smears, it is necessary to be able to observe a series of morphological characteristics such as size (length and thickness), characteristic shape, and presence of
recognizable structures both internal (digestive or reproductive tract) and external (mouth, lips, etc.). Moreover, inflammatory response is usually limited or nonexistent. A useful procedure to help recognize foreign bodies is the employment of polarized light, since many of these artifacts are birefringent.

The majority of the artifacts presented in this paper are considered sample contaminants (intrinsic contamination) or contaminants of cytological smears during their processing (extrinsic contamination). Similarly, a specific type of aquatic worms, rotifers, has been identified as a cytological smear contaminant,11 as has the presence of uncommon structures with morphological features similar to those of certain helminth eggs.12 Furthermore, certain types of fibers13 and classes of algae14 should also be taken into account in establishing a differential diagnosis.

Because of the importance of recognizing uncommon parasites in cytological smears, we have thought it necessary to present in this article a series of structures, considered as artifacts that should be taken into account in view of the possible confusions to which they may give rise.

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References