Exfoliative Cytology of the Esophagus

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With 9 Figures

1. Introduction

Probably Lionel Beale (1867) should be credited with the first reference in the medical literature on the use of cytological methods for the diagnosis of cancer of the digestive system. In his book "The Microscope and its Application in Clinical Medicine", Beale published several drawings of gastric and esophageal cells which he thought to be malignant. The first clinical paper in which cancer cells, obtained by a washing procedure from patients with gastric and esophageal cancer, were described according to modern criteria was published by Marini in 1909. In spite of the importance of these observations the cytological method never became popular, perhaps because of the rapid expansion of roentgenology as a practical diagnostic procedure. The publications by Papanicolaou (1942–1943) renewed the interest of several gastroenterologists for cytological methods, and in the last few years several books referring to gastrointestinal cytodiagnosis have been published (Papanicolaou, 1954; Bruinsma, 1957; Schade, 1960; VilardeLL, 1962; Graham, 1963; Nieburgs, 1967; Gibbs, 1968; Koss and Durfee, 1968; Henning and Witte, 1968).

In recent years, exfoliative cytology has become a valuable adjunct to endoscopy and radiology in the diagnosis of esophageal cancer, and a great variety of procedures have been recommended in order to obtain well preserved cells in sufficient numbers to provide an easy diagnosis of cancer.

2. Esophageal Cytological Techniques

The aim of all esophageal cytological techniques is to increase the number of cells which normally exfoliate from the surface of tumors, since, as Coman (1944) already demonstrated, cancer cells lack the adhesiveness of normal epithelial cells.

2.1. Techniques Combined with Esophagoscopy

Several authors have studied cytological samples obtained at endoscopic examination. Thus Andersen et al. (1949) were able to obtain diagnostic cells in cases in which biopsy had been inconclusive or negative. Messelt (1952) achieved good results using cotton swabs over areas that looked suspicious on esophagoscopy. More recently, Milanesi and Tosi (1965) have utilized a special tube in order to wash the esophagus and aspirate its contents under direct vision. Sanz and Remenik (1968) reported good results by the use of cotton swabs or bougies and washing the esophagus afterwards. Lance and Groissier (1965) have studied cancer cells by simply washing the esophagoscope at the end of the examination; they recovered positive samples in 68 per cent of proven cases of carcinoma.
In spite of the attractiveness of these methods, which permit the use of several diagnostic measures during one single examination (cytology, biopsy, photography, etc.) many experienced cytological laboratories still recommend cytology as an isolated procedure. They claim that with this method cells are better preserved and contamination of the smears with mucus, blood and foreign material is avoided (LANCE and GROISSIER, 1965). In our own experience, cytological material obtained through the esophagoscope is often heavily contaminated with detritus and mucus, which greatly interfere with microscopical examination. However, with the new fiber esophagoscopes we have recently obtained much better results. Cytological samples taken at fiber esophagoscopy will probably be the technique of choice in the future. In any case, cytological procedures should be performed prior to biopsy in order to avoid excessive amounts of blood and normal epidermoid cells in the smears.

2.2. Abrasive Techniques

The first instrument that has been widely employed to obtain blind cytol­ogical samples of the esophagus and stomach has been HENNING'S "Zelltupf­sonde" (1952). It consists of a flexible tube provided with a steel wire carrying at the distal end a foam rubber sponge. The tube is introduced into the esophagus and the sponge is pushed forward when the instrument has reached the lesion. A fine cellophane envelope, protecting the sponge from contamination with pharyngeal epithelium, is then broken, the lesion is swabbed for a few minutes and the sponge is reintroduced into the tube. Finally the sponge is rinsed with saline and the fluid centrifuged. The smears are stained with the Papanicolaou or Giemsa techniques.

AYRE and OREN (1953) introduced another type of instrument, the "gastric brush", which they utilized to obtain samples from the esophagus and stomach. It consists of a polythene tube to which a metallic capsule, about 7 cm long, is attached. Inside the capsule there is a double brush which is extruded by means of a spring mechanism. By rotating the instrument inside the esophagus or stomach, mucosal cells are abraded. The tube is then pulled out, the brush is washed with saline or Ringer's solution and the sediment obtained by centri­fugation is processed according to the usual Papanicolaou technique.

NIEBURGS' brush (1956), which is mainly used for gastric cytology, can also be employed. It consists of a flexible tube containing several nylon loops which can be extruded in order to obtain mucosal material by abrasion. The loops can be reinterted into the tube after abrasion by an external mechanism.

Other abrasive instruments have been devised in recent years. DEBRAY et al. (1967) have introduced a new apparatus which they call "Cyto-rape". It consists of a Camus tube with a metallic cylinder attached to its distal extremity. This cylinder has multiple perforations. Forceful aspiration attracts small fragments of mucosa into the tube which are removed after the tube has been pulled out. HUMPHREYS et al. (1968) use for abrasion a thin aluminum foil which envelops the distal end of a gastric tube. The cellular material is recovered afterwards by washing the esophagus with saline. COHEN and FLOWERS (1969) favor the use of small brushes like the ones used for cleaning electric razors. With this simple device attached to a tube, they were able to get 32 positive results out of 34 cases of cancer of the esophagus. Several years ago, HERSHENSON (1959) obtained good results by using a cotton swab attached to a metal piano wire.