Behaviour of the rectal juvenile polyp in vitro

HANS RÖMER, CARLOS COTTE, AND ERVIN ESSENFELD-YAHR

From the Service of Gastroenterology, Niños de Caracas Hospital, and the Department of Pathology, Laboratory of Tissue Culture, Anticanceroso Padre Machado Hospital, Caracas, Venezuela

SUMMARY The behaviour of the juvenile polyp in vitro and its cellular development from explants have been studied using cellular dispersion by the trypsinization technique. Only the fibroblastic cells have been found to grow. The significance of this finding suggests that the juvenile polyp is a hamartoma.

The juvenile polyp is found most often in the first decades of life, mainly in the rectum, less frequently in the sigmoid (Roth and Helwig, 1963), and even less often in the other segments of the colon.

Histologically, the juvenile polyp has an abundant stroma of connective tissue, with a dense infiltrate of round cells. In this stroma there are cystic glands lined by goblet cells (Römer and Essenfeld-Yahr, 1966). As a rule, the surface is ulcerated, with superficial and interstitial haemorrhage and granulation tissue (Fig. 1).

The juvenile polyp is considered to be a hamartoma and not a neoplasm by Morson (1962) and by Veale (1965), the latter suggesting that it might be of mesenchymal origin, an opinion confirmed by the electron microscopic studies of Weller and McColl (1966). According to other investigators juvenile polyps are of inflammatory (Mauro and Prior, 1957) or viral (Leuchtenberger, 1954) origin.

Material and Methods

Ten specimens were removed by diathermy or by simple section of the pedicle through a sigmoidoscope. Chloromycetin and tetracycline had been previously administered to six of the patients.

Each one of the specimens obtained was divided into two segments, one for histological study and the other for cell culture.

Cultures were obtained using techniques that have been described elsewhere (Cotte, Essenfeld-Yahr, and Calvo Lairet, 1968). Tissues were dispersed at 37°C with 0.25% trypsin solution under constant stirring for one hour, rinsed with Earle’s saline solution, and cultured in Leighton’s tubes with Eagle’s medium supplemented with 10% bovine serum. The fragments were cultured and then fastened to glass coverslips in Leighton tubes. Chick embryo extract and plasma plus Eagle’s medium supplemented with bovine serum were used as nutrient media.

Received for publication 21 October 1970.
Results

Ten specimens were processed (nine juvenile polyps and one adenoma). Of the nine juvenile polyps, three did not proliferate in vitro but six survived and developed for two to seven weeks. Some cultures were lost due to bacterial contamination. The adenoma failed to grow.

In cultures showing growth, only fibroblasts developed (Figs. 2, 3, and 4). Epithelial cells were not seen in any culture.

Two of the six positive cultures showed profuse growth and cellular proliferation persisting throughout the first week. Aging with degeneration and loss of the culture was always characterized by marked cytoplasmic vacuolization.

Juvenile polyps failed to show cellular proliferation when the patients had not received antibiotic treatment, or when the seeding had not been performed immediately after the extirpation of the specimen.

Discussion

Tissue culture is a refined method allowing the study of the different cell types which make up an organ or some of its parts (Willmer, 1965; Cotte et al, 1968). Experimental conditions make it possible for the investigator to follow the evolution of the different cellular components, and to study their inter-relationships as well as the physical, chemical, and biological factors capable of affecting the cultures (Penso and Balducci, 1963; Rosenoer and Jacobson, 1966; Paul, 1965).

The juvenile polyp is made up of connective tissue and glandular epithelium. Under the conditions prevailing in this study, it was found that only fusiform cells with fibroblastic characteristics developed. Epithelial cells did not proliferate.

At the very beginning of their development in primary cultures explants show all their component elements (Cotte et al, 1968). Later only that component which has adapted to the new conditions

Fig. 2 A small fragment of the polyp tissue showing development of fibroblastic cells after five days' incubation.

Fig. 3 Juvenile polyp culture. A detail of cells in a monolayer showing their fibroblastic morphology.
imposed survives. Some cultures tend to develop a single cell type. This can be interpreted to mean that the surviving cell has a greater capacity for growth and adaptation, or perhaps a greater genetic variability (Harris, 1964) which produces a more powerful growth competing favourably with other cell types with a lesser potentiality.

So far, only the mesenchymal elements have developed in cultures of juvenile polyps, suggesting that the stroma is the tissue with the highest growth potential, and implying that this lesion is a hamartoma. But to try and verify the observations reported here, it is necessary to study the juvenile polyp using organ cultures. In this way, it may be possible to observe the development of the cells in an organized form and thus appraise the interrelationship of the epithelial and connective tissue components of the polyp.

References


Fig. 4 Juvenile polyp culture. A culture of juvenile polyp by trypsinization after 48 hours’ growth.