

Cancer of the Stomach after Operation for Benign Ulcer Disease

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ABSTRACT

Despite a great number of studies during almost three decades it has not been possible to satisfactorily answer the question how the risk of developing cancer of the stomach is affected by operation for ulcer disease. The answer to this question is interesting from a tumourbiological point of view and practically important when choosing treatment and follow-up routines. In principle this can be said to be a test case for clinical problems that can be solved most effectively by epidemiological research methods. In this brief survey are summarized first the state of knowledge in the field and the methodological problems that have made it hard to study the question. Then a historical cohort study is reported which has just been finished in the health care region of Uppsala. By following a sufficiently great number of individuals (fully 6,000) over a long time (25-33 years) and using multivariate methods of analysis it was possible to demonstrate a consistent and complex pattern of a changed risk of cancer of the stomach after partial gastrectomy according to Billroth I and II. Not only the choice of surgical method influences this risk but also age at operation, diagnosis, the length of the observational follow-up, and the sex of the patient.

BACKGROUND

Since a few decades the question if the risk of cancer of the stomach increases after partial gastrectomy at benign ulcer disease has engaged the surgeons of the world. In the 50's investigations were published from Norway (2) and Sweden (3) which showed an increased risk of cancer of the stomach after partial gastrectomy. Since then a great number of studies have been published that both speak in favour of and against such an increased risk. In addition, various risk factors such as time after operation, sex, surgical

method, preoperative diagnosis, and age at operation have been described. The problem inherent in many earlier investigations has above all been that they have been based on limited patient materials which has entailed difficulties in statistically settling suspicious associations.

METHODOLOGIC ASPECTS

In the middle of the 80's two studies were published from England (1) and Norway (5) in which a great number of patients are being followed over a long period of time. Common to these two investigations is that the risk of cancer of the stomach is elevated only 20 years after partial gastrectomy and that it depends on the surgical method and the localization of the ulcer disease.

The problem can be characterized as typically epidemiological. The issue is whether, in a certain group of individuals (patients having undergone partial gastrectomy), there is an increased incidence of a certain disease (cancer of the stomach). The hypothesis can be studied either by case-control methodology or by cohort methodology. In the former case one was to investigate in all patients who were taken ill with cancer of the stomach whether these were operated on by partial gastrectomy or not. To these patients a control group was then to be selected in which the prevalence of partial gastrectomy in the background population was to be delineated. Partial gastrectomy being relatively infrequent in the population, a great number of patients with cancer of the stomach are required to settle an increased risk, particularly if the increase is a moderate one. It takes a long study period to gather a sufficient number of patients in a vast geographical area.

In a cohort study a number of patients operated on by partial gastrectomy are identified whereupon these are followed as regards when they were taken ill with cancer of the stomach. In comparison is used a group of individuals who have not undergone partial gastrectomy and who have a known incidence of cancer of the stomach. In Sweden - with access to reliable incidence rates from the cancer register - the entire population can be used as control group. With this methodology the cohort has to be developed retrospectively in order to make the follow-up time long enough.

THE UPPSALA COHORT STUDY

In order to illustrate the issue whether cancer of the stomach is increased or not after ulcer operation we have in a recently finished study (4) chosen to use the cohort methodology, more exactly a retrospective cohort.

When planning the study the following demands have been made:

1. The size of the cohort should exceed 6,000 patients to make it possible to statistically settle an increased risk of about 50 per cent.
2. The gathering of the cohort should be carried out from a strictly defined population where all patients who have undergone partial gastrectomy should be included.
3. The follow-up time for the cohort ought to exceed 25 years.
4. At least 90% of the individuals in the cohort should be available for complete follow-up.

From operation ledgers of 5 county councils (those of the county councils of Örebro, Västmanland, Uppsala, Kopparberg, and Gävleborg) were identified all patients operated on by partial gastrectomy 1950-1958. All hospitals at which surgery was carried out during this period of time were visited by one of the investigators. On the first visit information was collected on the type of operation and the patient's hospital record number. In some cases name, sex etc. were also mentioned. These data was then entered in a computerized register and the information was supplemented with name, date of birth, and address during a second visit to the hospitals. By means of this varying information the patients' unique national registration numbers were then procured from the parish offices.

By linking the computerized cohort with the register of Causes of Death and the Emigration Register of Statistics Sweden as well as the Cancer Register the cohort could be completed with data on cancer diagnosis (and the date of this), date of death, and date of emigration. Starting from these data the number of observed and expected cases of cancer of the stomach in the cohort was calculated each follow-up year and distributed on sex and age (5-year groups). Standardized incidence ratio (SIR) is defined as the ratio between observed and expected number of cancers of the stomach.

In sum this study demonstrates an unchanged risk of cancer of the stomach overall, but a complex pattern of significant differences between various subgroups of the cohort. There was thus for example a decreased risk during the first 20 years and then it was elevated. Women and young individuals ran a greater risk of developing cancer of the stomach. Ulcer of the stomach as a preoperative diagnosis and partial gastrectomy according to Billroth II increased the risk (4).

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