Hospital Topics

Sterilisation failure

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Summary

During 1969-76 77 pregnancies occurred after sterilisation in Aberdeen. The overall pregnancy rate was higher for laparoscopic sterilisation (1.2%) than for non-laparoscopic methods (0.23%), although there has been a great improvement over the past three years. The pregnancy rate was double if sterilisation was combined with termination of pregnancy, and in 30% there were surgical difficulties. Inexperienced operators were responsible for over 80% of the failures. The ectopic pregnancy rate was 15.6%.

Introduction

Since 1969 there has been a threefold increase in the annual number of sterilisations performed in Aberdeen. In 1969 only 14% (84) of these were laparoscopic but by 1976 there was a 14-fold increase to 80% (1217) (table I). The pregnancy rate has been high after laparoscopic sterilisation.¹ In this study I investigated the reasons for this high failure rate and for the improvement since 1973.

Methods

The case notes of all patients who were sterilised during 1969-76 and later became pregnant were examined. All laparoscopic sterilisa-

tions and the great majority of non-laparoscopic sterilisations in the north-east of Scotland are performed in Aberdeen. The population in this area is relatively stable so most of those who became pregnant after sterilisation could be traced.

Results

Pregnancy rates—The overall pregnancy rate decreased from 0.7% in 1969 to 0.13% in 1976. The rate after tubal ligation remained much the same throughout the period (table II). In the earlier years pregnancy rates after laparoscopic sterilisation were high, but there has been a dramatic decrease since 1973. By October 1977 there were only two pregnancies in patients sterilised in 1976, though others may occur as the follow-up period becomes longer.

Age and parity—The mean age at first sterilisation was 31 for each year studied. Many women (38%) were under 30 and 9% were under 25. The mean parity was three: 5% of patients had one or no children while 25% had four or more.

Time lapse between sterilisation and pregnancy—Table III shows the time lapse in months between the first sterilisation and the last menstrual period of the subsequent pregnancy. Within one year of sterilisation 52% of these patients had become pregnant and 73% within two years. Only 9% of pregnancies occurred after three years.

Gestation when pregnancy diagnosed—The mean gestation when pregnancy was diagnosed was 11 weeks. Twenty-one patients (27%), however, were not referred till gestation was past 12 weeks.

FACTORS AFFECTING RELIABILITY OF STERILISATION

Termination of pregnancy at sterilisation—The overall pregnancy rate was doubled in the group who had had a pregnancy terminated with their first sterilisation (table IV). Although the total numbers of abortions and sterilisations performed separately have increased, the number of combined operations since 1974 dramatically decreased, possibly owing to an unexplained maternal death that occurred in 1975 during a combined procedure.

Difficulties encountered during operation were mentioned in 23 (30%) of the failures. Seven patients had lower abdominal scars but in only

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TABLE I—Total numbers of sterilisations performed in Aberdeen 1969-76. Percentages in parentheses

	1969	1970	1971	1972	1973	1974	1975	1976	Total
Laparoscopic	84 (14)	180 (22)	265 (23)	579 (43)	886 (62)	1086 (71)	1177 (78)	1217 (80)	5474 (55)
Total ligation	121 (21)	105 (13)	156 (14)	177 (13)	93 (7)	85 (6)	108 (7)	107 (7)	952 (10)
Hysterotomy and sterilisation	102 (18)	150 (18)	177 (16)	111 (8)	40 (3)	14 (1)	10 (1)		604 (6)
Post-partum tubal ligation	273 (47)	382 (47)	539 (47)	499 (36)	408 (29)	348 (23)	221 (15)	193 (13)	2863 (29)
Total	580	817	1137	1366	1427	1533	1516	1517	9893

TABLE II—Pregnancy rates after sterilisation 1969-76. Percentages in parentheses

	1969	1970	1971	1972	1973	1974	1975	1976	Total
Non-laparoscopic	1 (0.2)	1 (0.16)	2 (0.23)	3 (0.4)	1 (0.18)	1 (0.22)	1 (0.25)		10 (0.23)
Laparoscopic	3 (3.6)	11 (6.1)	7 (3.6)	8 (1.4)	24 (2.7)	7 (0.64)	5 (0.42)	2 (0.16)	67 (1.2)

TABLE III—Time lapse between sterilisation and pregnancy (months)

Months:	≤5	6-11	12-17	18-23	24-29	30-36	>36	Total
No ("n") of pregnancies	21 (27)	19 (25)	7 (9)	9 (12)	6 (8)	8 (10)	7 (9)	77 (100)

two of these were adhesions said to have caused difficulty. Unexpected adhesions, however, were encountered in another four cases. Obesity caused difficulty in at least five cases (7%). The average weight of patients who had failed sterilisation was 60.75 kg, and 16 (20.8%) weighed more than 70 kg. Other difficulties included: poor view due to misting up or other faults of laparoscope, tubal bleeding, and extraperitoneal insufflation; and in two cases tubal ligation was attempted through a 2.5 cm incision.

Grade of operator—Junior staff were responsible for most sterilisation failures (table V). Most non-laparoscopic sterilisations were performed by juniors during this period. During 1969-71 more than half of all laparoscopic sterilisations were performed by consultants, but since then this proportion has decreased until in 1976 they performed less than 20%.

Experience of operator—Of the 31 different operators responsible for these failures, 20 had performed less than 30 laparoscopies before their first failed sterilisation, and only nine operators more than 100.

Division of tubes—At sterilisation the state of the tubes was known in 66 cases. Both tubes were found to be divided only in five cases, and both tubes were obviously damaged without separation in 11 cases. At the first sterilisation, however, the tubes were said to be divided in 22 cases and not divided in 23 cases. (In 32 cases division of tubes was not mentioned.) In only 38% did the findings at the second operation agree with the record after the first operation.

Surgical errors—Both tubes were macroscopically normal in three cases, while one or both tubes appeared macroscopically normal in 38 cases. The round ligament was found to be divided in six cases in the presence of a normal looking tube on that side.

OUTCOME OF PREGNANCIES

Termination of pregnancy was requested by 51 (66%) patients, and, of these, 37 had suction termination, six prostaglandin termination, and seven hysterotomy with repeat sterilisation; in one case a routine hysterectomy was performed and pregnancy was a surprise finding.

Ectopic pregnancy—There were 12 tubal pregnancies in this survey (15.6%). Three of these were in those who had had open tubal ligation. The state of the tubes was noted in eight cases, and in six of these the tube was completely separated on the side of the ectopic pregnancy. In one case the tube was obviously damaged but not separated and in another the tube was macroscopically normal.

Intrauterine pregnancy—There were 14 cases of intrauterine pregnancy that were not terminated. Seven had spontaneous abortions in the first trimester, and of these three refused resterilisation. Seven patients had normal full-term pregnancies and of these, four refused resterilisation.

RESTERILISATION

Of the 70 who requested resterilisation, 27 (39%) had laparoscopic resterilisation.

Discussion

Laparoscopic sterilisation has largely replaced other forms of sterilisation in Aberdeen. The advantages of speed, short hospital stay, and small abdominal wound are not acceptable at

the cost of high complication and failure rates. After the alarmingly high pregnancy rate in the earlier years had been demonstrated, however, greater care was taken in training juniors, with emphasis on adequate cautery to the tubes; and since 1973 the pregnancy rate has dropped to a more acceptable level.

TABLE V—Pregnancy rates after sterilisations performed by consultants and registrars during 1969-76. Percentages in parentheses

	1969-70	1971-2	1973-4	1975-6	Total
Consultants	8 (50%)	8 (40%)	13 (39%)	1 (13%)	30 (39%)
Senior registrars	1 (6%)	2 (10%)	3 (9%)	2 (25%)	8 (10%)
Junior registrars	7 (44%)	10 (50%)	17 (52%)	5 (63%)	39 (51%)
Total	16	20	33	8	77

Thompson and Wheelless² in a series of 32 failures report a high failure rate in earlier years (1.7%), decreasing to 0.25%. Our failure rate of around 0.2%, for tubal ligation compares favourably with a combined reported rate of up to 2% with the Pomeroy technique³ and up to 4.7% with fimbriectomy.⁴

Our finding that sterilisation performed with termination of pregnancy is less reliable confirms the findings of other surveys.^{3,5} Cunanan and Courey⁶ reported a low pregnancy rate with the combined procedure, but their follow-up was only for six months. In recent years fewer combined operations have been performed because there are few hysterotomies and also because some operators are doing abortions under local anaesthesia followed by interval sterilisation.

Difficulties at operation were mentioned in 30% of the failures. It would probably be safer, therefore, to proceed with laparotomy when difficulties such as adhesions, tubal bleeding, and other causes of poor view are encountered. But previous lower abdominal surgery in itself should not be a contra-indication to laparoscopic sterilisation.

The experience of the operator is obviously important and some consider that an operator should not be left unsupervised until he has had experience with at least 100 laparoscopies.⁷ Only 12% of our failures were caused by "experienced" operators.

Surgical error is the major cause of the high failure rate. In almost half the cases one or both tubes were macroscopically normal. Wheelless now claims a failure rate of 0.25%,⁸ and indicates that this improvement is partly due to a "three-burn tubal transection," while Liston *et al*⁹ recommend no division. No matter what the technique as much tube as possible should be destroyed if the failure rate is to be further reduced.

The ectopic pregnancy rate after sterilisation is high for both open and laparoscopic methods. Our rate of 16% compares with reported rates ranging from 12%¹⁰ to 33%.¹¹

Most patients request termination when they realise they are pregnant but many are not referred till after the first trimester. A surprising number refused resterilisation, some because they were happy with the idea of further pregnancies. Two patients' husbands had vasectomies, and one patient left the city.

Seven patients who had undiagnosed pregnancies at the time of sterilisation were not included in the study. Four of these patients had curettages performed without disturbance of the pregnancy.

Since 1973 we have seen an encouraging drop in the pregnancy

TABLE IV—Pregnancy rates after sterilisation with and without associated termination of pregnancy operations 1969-76. Failure rate percentages in parentheses

	1969	1970	1971	1972	1973	1974	1975	1976	Total
All sterilisations without termination	439 (0.46)	598 (1.2)	850 (0.82)	1011 (0.89)	1128 (1.1)	1256 (0.32)	1331 (0.45)	1347 (0.15)	7960 (0.64)
All sterilisations with termination	141 (1.4)	219 (2.3)	287 (0.70)	355 (0.56)	299 (3.7)	277 (1.4)	185	170	1933 (1.34)
Laparoscopic sterilisations with termination	25 (4.0)	54 (11.0)	100 (2.0)	196 (1.0)	241 (4.6)	238 (1.3)	153	153	1160 (2.2)
Non-laparoscopic sterilisations with termination	116 (0.9)	165	187	159	58	39	32	17	773 (0.12)

rate after sterilisation. This can be further reduced if the operation is performed by experienced operators, if more of the tube is destroyed, if combined procedures with termination of pregnancy are avoided, and if operators are prepared to go ahead with laparotomy when circumstances are not ideal for laparoscopy.

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Contemporary Themes

The National Poisons Information Service and hospital admissions for children—the experience in Wales of the Cardiff Centre

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Summary

When inquiries to the Cardiff Centre of the National Poisons Information Service were compared with hospital admissions in the eight health authorities in Wales the findings suggested fewer admissions in the area within which the centre is situated and showed a more extensive use in that area than elsewhere. High inquiry rates were associated with high hospital admission rates when the eight areas were compared. If the service were delegated to area level a more complete community use would result.

Introduction

Admissions for acute poisoning continue to increase¹⁻⁴ even though high-risk groups have been identified⁵ and methods of primary prevention suggested. Less attention has been directed to providing alternative ways of dealing with the problem. We analysed recent data from the Cardiff Centre of the National Poisons Information Service to determine whether the service had prevented unnecessary admissions in the health authority in which the centre is situated and in Wales as a whole. The purpose was to consider preventing unnecessary admissions, reducing costs, and finding the most appropriate organisation to do this.

We focused on children in the age group 0-14, who were the

subject of 64% of inquiries to the Cardiff centre in 1975. The suicidal motivation is largely eliminated; children have a greater tendency than adults to poison themselves with non-medicinal substances, for which the National Poisons Information Service (NPIS) is specially equipped to offer help, and the increase in their hospital admissions over the years has been much the same order as in adults.⁶

Materials and methods

Sources of information for 1975 were the records of the Cardiff centre of the NPIS; the hospitals in South Glamorgan to which poisoning emergencies are normally admitted; and hospital activity analysis (HAA) data on discharges from hospitals in each of the eight area health authorities (AHA) in Wales. We looked for evidence of fewer admissions than requests to the NPIS for defined groups of substances in South Glamorgan, and compared request rates with hospital discharge rates for the eight AHAs.

In the Cardiff centre, each call is recorded with the date; name and address of the caller; telephone number, name, age, and sex of the patient; and the substance leading to the inquiry. Substances were classified under six headings (table I). The same classification was used for hospital admissions.

Results and comment

There were 248 calls about patients living in the emergency catchment area of the hospitals and 405 admissions for poisoning with an identified substance. The age and sex distributions of the two groups were almost identical, with more than 80% aged 0-4, usually boys, and the modal age 2-3. Table I shows the groups classified by causal agent, and these differed greatly. Fifty-six per cent of inquiries compared with 20% of admissions concerned non-medical substances, the excess being not only proportionate but absolute (column 3 of table I).

Scrutiny of the drugs showed little difference between the two groups. In both some drugs had clearly been intended for the child, but most for adult members of the household; in some cases there

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