TRIAL OF SCAR WITH INDUCTION/OXYTOCIN IN DELIVERY FOLLOWING PRIOR SECTION

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Summary: During the ten year study period, April 1972 to March 1982, there were 1,498 patients, with one or more prior caesarean section delivered at the Regional Hospital, University College, Galway. Trial of scar (TOS) was undertaken in 844 (56.34%) patients and the remaining 654 (43.66%) had a repeat elective caesarean section. There were 546 (64.69%) TOS patients who had some form of induction/augmentation and in 269 (49.26%) oxytocin was used, singularly and in combination with other induction methods and successful vaginal delivery was attained in 222 (82.52%) patients. There was no increased incidence of true rupture (TR) or bloodless dehiscence (BD) associated with the use of induction/augmentation or oxytocin in this series. There was a 50% perinatal mortality associated with TR, but there was no maternal death in TOS patients, with or without a successful trial. An incidence of TR of 1 : 169 patients is no justification for the "once a section, always a section" idiology, widely practiced in North America today.

INTRODUCTION

Accepting that current literature attests to the merits of a trial of scar (TOS), as against elective repeat section, in patients with a previous lower segment caesarean section, several major clinical issues have not been adequately addressed, and consequently remain unresolved ([1]). One such unanswered question is induction, with particular reference to the use of oxytocin. As uterine rupture is a major fear consequent on allowing patients with a scarred uterus a trial of labour ([2]), the use of intrapartum oxytocin could well be associated with an increased risk of uterine rupture with its attendant, maternal and fetal sequelae ([3]) and wide application of its use has not been observed ([4]).

Since there are reservations regarding induction, by whatever method, it is not surprising to find obvious controversy regarding oxytocin infusion, in patients with a scarred uterus. As a guiding rule, the best way to ensure vaginal delivery is to await the spontaneous onset of labour ([3]), but either fetal or maternal interests may necessitate termination of pregnancy, by induction or repeat section.

Graham ([5]) agreed in principle with this approach, but gave as his reason the significant benefit obtained in the assurance that the fetus had reached the maximum obtainable maturity. Morewood *et al.* ([6]) felt the argument of allowing a patient with a scarred uterus to await the spontaneous onset of labour to offset iatrogenic prematurity to be no longer valid. They believed that recent advances, i.e. amniotic fluid (lecithin/sphingomyelin) studies, ultrasonic assessment of the fetus and x-ray maturity by epiphyseal presence, made it obsolete. We must bear in mind the hazard of elective delivery at term described by Maisels *et al.* ([7]), and the report by Meier and Porreco ([8]) on a similar topic, and insist that caution must rule in elective delivery by section, even of the term fetus. In contrast, Lavin *et al.* ([1]) laid emphasis on the early application of fetal scalp monitoring and internal tocodynamic measurements, as an argument in favour of surgical induction.

PATIENTS AND METHODS

A retrospective analysis of the case records of 1,498 patients with one or more previous caesarean sections (maximum number = ten) de-

Table 1. – *Induction/acceleration.*

	Patients with scarred uterus		Trial of scar patients		Vaginal delivery	
Total	1498		844		702	83.18%
Induced	285	19.03%	285	33.77%	227	79.65%
Accelerated	261	17.42%	261	30.92%	235	90.04%
Spontaneous labour	298	19.89%	298	35.31%	240	80.54%
Elective LSCS	654	43.66%				
Oxytocin			269	31.87%	222	82.53%
Induction			191	71.00%	154	80.63%
Acceleration			78	29.00%	68	87.18%

livered at the Regional Hospital Galway during the ten years, April 1st 1972, and March 31st 1982, was personally undertaken. There were 844 (56.34%) patients subjected to a TOS and the remaining 654 (43.66%) had repeat elective caesarean section. Labour was induced/augmented in 546 (64.69%) TOS patients and oxytocin was used, singularly and in combination with other induction procedures in 269 (49.26%). We have never accepted Craigin's dictum [9] and without a recurring indication for section, attempted vaginal delivery is the rule. In the earlier years of the study, i.e. before the late seventies, fetal monitoring was not always available and might well explain the high perinatal mortality rate [10]. Titration techniques for oxytocin were not yet implemented and another contributory factor was undoubtedly long labours (>24 hours) which are now considered unacceptable.

Great emphasis is laid on the patients vital signs, and continuous fetal monitoring *without* intrauterine pressure studies is routinely employed. Oxytocin is administered as a solution of 15 units in 1 litre of 5% Dextrose, given by continuous intravenous infusion using an automatic pump. This dose is titrated against the patients response. In patients who have a scarred uterus the maximum permissable dose is 12 mU per minute and can be raised to a maximum of 40 mU per minute by the attending obstetrician. In primigravidae the maximum dose is 60 mU per minute. Routine vaginal examination during labour and following delivery is practiced, to assess the integrity of the scar [3]. The former is reserved for patients with signs and symptoms suggestive of scar dehiscence/rupture, during the TOS. Presently, spontaneous labour is awaited unless an obstetric indication for interference is manifested. Statistical analysis was performed using the student t test and chi squared analysis with Yates correction for continuity for discrete variables was applied.

RESULTS

There were 844 patients subjected to a TOS, of which 285 (33.76%) were induced and 227 (79.65%) of these delivered vaginally. Another 261 (30.92%) were accelerated in labour and 235 (90.04%) delivered vaginally. Spontaneous labour occurred in 298 (35.30%) patients and 240 (80.53%) had successful vaginal delivery (table 1).

The yearly breakdown shows a decrease in the number of induced labours after 1979, although the number of patients with a prior section had increased (table 2). This was shown to be statistically significant as was the corresponding increase in the number undergoing acceleration. Induction had decreased from 41.17% patients with a scarred uterus in 1972, to 20.9% in 1981 and 19.2% in 1982 respectively. The figures for acceleration meanwhile, had increased from 22.05% in 1972 to 43.02% in 1981 and 50% in 1982.

The analysis of the type of delivery against the induction/acceleration method employed in TOS patients showed 479 (56.75%) patients had a spontaneous vertex delivery and 187 (22.15%) had forceps with 142 (16.82%) patients requiring emergency caesarean section (table 3). Analysing these figures further, only 34 (18.18%) patients with a spontaneous onset of labour required forceps. There

Table 2. – *Induction/acceleration (yearly incidence).*

Year	Total patients		Trial of scar patients				
			Total		Induc.	Accel.	Spont. labour
1972	90	6.01%	68	8.06%	28	15	25
1973	119	7.94%	76	9.00%	24	28	24
1974	149	9.95%	92	10.90%	43	23	26
1975	114	7.61%	61	7.23%	27	9	25
1976	123	8.21%	70	8.29%	32	17	21
1977	162	10.81%	84	9.95%	22	28	34
1978	140	9.35%	72	8.53%	35	23	14
1979	177	11.82%	99	11.73%	33	29	37
1980	197	13.15%	110	13.03%	18	39	53
1981	173	11.55%	86	10.19%	18	37	31
1982	54	3.60%	26	3.08%	5	13	8
Total	1498	100.00%	844	100.00%	285	261	298

Induc. = Induced; Accel. = Accelerated; Spont. = Spontaneous.

were 79 (42.24%) patients with forceps delivery who had labour induced and 74 (39.51%) patients who had forceps delivery were accelerated in labour. Another 58 (40.84%) patients with induced labour and 26 (18.30%) with accelerated labour required an emergency section for delivery. In total, 84 (59.15%) of 142 emergency section patients, had either induction or acceleration of labour. A detailed breakdown is provided (table 3). It was shown that 79% of the induced patients and 90% of patients with augmented labour delivered vaginally, as against 80% of patients who achieved successful vaginal delivery following spontaneous onset of labour.

Oxytocin was used singularly and in combination with other induction procedures in 269 (31.87%) TOS patients and 222 (82.5%) had a successful vaginal delivery. It was used for induction in 55 (69.52%) of the 79 patients who had forceps delivery and a further 28 (37.84%) of 74 patients who had augmented labour ending in forceps delivery. Oxytocin was also used for induction in 37 patients who repuired emergency caesarean section, which in turn was 63.79% of the 58 patients who had induction and were subsequently delivered by emergency section. It was used for augmentation in ten patients, which was 38.46% of the 26 patients who had augmented labour and later required emergency section.

Postmaturity was the commonest indication for induction and occurred in 107 (37.54%) of the total patients induced. The obstetric history was the nominated indication in 48 (16.84%) patients and TOS was the declared indication in 32 (11.13%) patients. When multiple indications for induction were considered, the nominated indications above were still dominant, with the fetus at risk/placental insuffiency group named in 20 (5.11%) patients.

The induction/acceleration method and yearly numbers are given (table 4). When considered as a percentage of 844 TOS patients 7.9% had oxytocin, 31.9% had an artificial rupture of the membranes (ARM), 0.71% had prostaglandin and 23.81% patients had ARM combined with oxytocin.

Table 3. – *Method of induction/acceleration/delivery.*

Type of delivery		Oxytocin	ARM	Prosta-glandin	ARM + Oxytocin	ARM + Prosta-glandin	ARM+ Oxytocin+ Prosta-glandin	Total
SVD	induced	9	43	1	82	1	0	136
	accelerated	17	117	2	19	0	0	155
	none							188
Forceps	induced	6	23	1	49	0	0	79
	accelerated	11	46	0	17	0	0	74
	none							34
Em. CS	induced	13	20	1	24	0	0	58
	accelerated	5	15	1	5	0	0	26
	none							58
Breech	induced	2	0	0	1	0	1	4
	accelerated	2	1	0	1	0	0	4
	none							10
Vacuum	induced	0	2	0	0	0	0	2
	accelerated	1	1	0	0	0	0	2
	none							4
Twins	induced	1	2	0	3	0	0	6
	accelerated	0	0	0	0	0	0	0
	none							4
Total	induced	31	90	3	159	1	1	285
	accelerated	36	180	3	42	0	0	261
	none							298
Total		67	270	6	201	1	1	844

Excluding elective C.S.

There were five true ruptures (TR) and 12 bloodless dehiscences (BD) in the 844 TOS patients (1:169 for TR). Two patients with TR were induced and one had oxytocin stimulation, while four patients with BD were induced and three received oxytocin. There were three perinatal deaths associated with TR in TOS patients. There was no maternal death in 844 patients subjected to a TOS whether successful or otherwise.

DISCUSSION

Augmented labour secured a higher vaginal delivery rate than that found in non-stimulated patients, whereas success in the latter was similar to that found with induced labour. These findings are at variance with those of Horenstein and Phelan ([11]) who found a 69% successful vaginal delivery rate in stimulated patients, as against 89% success in those not recieving oxytocin.

Before 1980, according to Flamm *et al.* ([2]), reports were almost non-existant in the American literature on the use of oxytocin for TOS patients. They considered this understandable since uterine rupture was the greatest fear in these patients. They went on to say that since most TOS reports deal with unmonitored patients,

Table 4. – *Method of induction/acceleration (yearly breakdown).*

Year	None	Oxytocin	ARM	Prostaglandin	ARM + Oxytocin	ARM + Prostaglandin	ARM + Oxytocin + Prostaglandin	Total
1972	25	7	18	0	18	0	0	68
1973	24	3	29	0	20	0	0	76
1974	26	4	36	1	25	0	0	92
1975	25	2	13	0	21	0	0	61
1976	21	6	18	0	25	0	0	70
1977	34	13	23	0	14	0	0	84
1978	14	8	21	0	29	0	0	72
1979	37	10	31	0	21	0	0	99
1980	53	6	39	2	9	0	1	110
1981	31	6	32	2	14	1	0	86
1982	8	2	10	1	5	0	0	26
Total	298	67	270	6	201	1	1	844
Total	induced	31	90	3	159	1	1	285
	accelerated	36	180	3	42	0	0	261
	none							298

the paucity of oxytocin usage in past studies was reassuring. Oxytocin was used for both induction and augmentation and secured an 82.5% successful vaginal delivery incidence in this study. However assisted delivery and operative intervention were more commonly associated with its use. British Isles operators have used oxytocin for years ([12, 13, 14, 15, 16]). MacKenzie *et al.* ([16]) reported on induction of labour at term with vaginal prostaglandin E_2, the first such series recorded.

Their study also contains data on oxytocin augmentation of 75 of their 143 trial of labour patients, induced in this way. They stress the need for caution because of the synergistic effect of these two substances, (Prostin+Oxytocin), when used in combination. Whereas they had to augment labour in patients induced with prostaglandins, Porreco ([17]) found that failed induction with prostaglandin E_2 gel, was unusual.

There were 546 (64.69%) TOS patients with some form of labour stimulation. The yearly breakdown shows a consistent use of ARM as a form of acceleration during the ten year study period. A combination of oxytocin and ARM was the favoured type of stimulation before 1980. It was replaced by ARM and the spontaneous onset of labour. This change is statistically significant. The number of patients not receiving stimulation had increased significantly as shown by the 53 (48.18%) of 110 patients in 1980, as against 24 (31.57%) of 76 patients treated in 1973.

Meehan *et al.* ([3]) had used oxytocin in 25 of their 75 patients, and felt it illogical to withold therapeutic doses of a drug which can be beneficial, subject to careful monitoring. This becomes all the more important, when the alternative is repeat after repeat section.

Fetal heart monitoring was used in 224 (26.54%) patients, chiefly because it was not always available in the earlier years of the study. No patient had internal tocodynamic monitoring in this series. The use of fetal monitoring is now considered mandatory but internal tocodynamic studies are not performed.

The figures for duration of labour in this series are statistically significant, showing that with labour >12 hours patients were more likely to have forceps delivery or emergency caesarean section. Labours >12 hours were found in 23 (4.80%) of 479 spontaneous normal delivery patients and 24 (12.83%) of 187 patients who had a forceps delivery, as against 25 (17.60%) of the 142 patients who required emergency repeat caesarean section. The duration of labour in induced/augmented patients depended on the cervical status at the commencement of the procedure ([16]). When elective caesarean section patients were excluded and duration of labour in different parity groups was considered, it was shown the higher the parity, the shorter the labour. Figures are too few in higher parity ranges to define statistical relevance.

There is no significant difference in either TR or TR combined with BD incidence, in patients given oxytocin, when compared with those with rupture/dehiscence, in whom it was withheld. Properly monitored oxytocin administration subjects the patient to no greater risk of scar dehiscence/rupture. The importance of securing informed consent for this management is obvious. There was no maternal death in TOS patients and the perinatal mortality associated with TR was 50%.

CONCLUSION

One must accept therefore, that in general, labour is likely to be longer when induction/augmentation is required, with a greater likelihood of delivery assistance but an increased incidence of successful vaginal delivery. Parity also plays a part, and those with higher parity are less likely to require induction and/or augmentation and labour is likely to be shorter, with less need for instrumental delivery and greater success in attaining a vaginal birth.

Consequently, induction/augmentation in TOS, will help attain a higher incidence of successful vaginal delivery and in our practice is preferable to the alternative, "once a section, always a section". Oxytocin should be respected, but not feared, and caution must be the order of the day when it is used with or without a scarred uterus. Once expects the intrauterine pressure to reach approximately 50 mm of mercury, whether augmentation is, or is not used, and there is no reason to believe that with proper titration techniques, oxytocin will produce pressures above this level. By the same token, augmented labour producing this pressure, is no more dangerous to a uterine scar than the same pressure produced without augmentation.

Craigin's dictum was proper management in a different era as it referred to classical caesarean section. This concept is still correct and applicable to the classical procedure but should not be continuously abused, as happens in most instances, when it relates to the lower segment section scar.

Results from modern management protocols with TOS no longer justify the, "once a section, always a section" idiology. Therefore in the interests of patients, the concept as practiced should again be denounced and now declared defensive obstetrics, by our obstetric peers.

BIBLIOGRAPHY

1) Lavin J. P., Stevens R. J., Midovnik M., Barden T. P.: *Obst. Gyn., 59*, 135, 1982.
2) Flamm B. L., Dunnett C., Fischermann E., Quilligan E. J.: *Am. J. Obst. Gyn., 148*, 759, 1984.
3) Meehan F. P., Moolgaoker A. S., Stallworthy J.: *Br. Med. J., 2*, 740, 1972.
4) Silver R. K., Gibbs R. S.: *Am. J. Obst. Gyn., 156*, 57, 1987.
5) Graham A. R.: *Am. J. Obst. Gyn., 149*, 35, 1984.
6) Morewood G. A., O'Sullivan M. J., McConney J.: *Obst. Gyn., 42*, 589, 1973.

7) Maisels M. J., Rees R., Marks K., Friedman Z.: *JAMA, 238*, 2036, 1977.
8) Meier P. R., Porreco R. P.: *Am. J. Obst. Gyn., 144*, 671, 1982.
9) Craigin E. B.: *N. Y. State Med. J., 104*, 1, 1916.
10) Meehan F. P., Burke G., Casey C., Sheil J. G.: *Am. J. Perinatol.*, in press, Jan 1989.
11) Horenstein J. M., Phelan J. P.: *Am. J. Obst. Gyn., 151*, 564, 1985.
12) Allahbadia N. K.: *Am. J. Obst. Gyn., 85*, 241, 1963.
13) Browne A. D. H., McGrath J.: *J. Obst. Gyn. Br. Emp., 72*, 557, 1965.
14) McGarry J. A.: *J. Obst. Gyn. Br. Cwlth., 76*, 137, 1969.
15) Uppington J.: *Anaesthesia, 38*, 336, 1983.
16) MacKenzie I. Z., Bradley S., Embrey M. P.: *Br. J. Obst. Gyn., 91*, 7, 1984.
17) Porreco R. P.: *Obst. Gyn., 65*, 307, 1985.