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HYPERTONIC SOLUTIONS IN MID-TRIMESTER ABORTIONS
A COMPARATIVE ANALYSIS OF DIFFERENT SOLUTIONS AND
DIFFERENT METHODS

by

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Medical facilities serving an indigent and/or largely teenage population are still faced with the necessity of furnishing pregnancy termination procedures in the midtrimester. The current method of choice for induction of midtrimester abortion is the intraamniotic instillation of hypertonic solutions. The most commonly employed solutions are 20% saline and 40% urea. The instillation can be done by abdominal paracentesis or by transcervical amniocentesis.

Much original work on saline abortions was done by Csapo and Bengtsson (1962) and Wagner and Fuchs (1962). All these authors have preferred transabdominal method of instillation. Ruttner (1966) was the first to employ the transcervical method. Fuchs (1967) advised vaginal method of instillation in order to avoid injuries to the intestines. Mitra *et al* (1975) have reported favourable results

with transcervical instillation of 20% saline.

Because of the potential hazards of hypernatraemia associated with saline injection, several investigators explored the utilisation of intraamniotic urea to induce abortion (Greenhalf and Diggory, 1971; Pugh *et al* 1971; Raud *et al* 1972; Weinberg and Shepard, 1973; Anteby *et al* 1974; and Weinberg *et al* 1975). Its efficacy in inducing abortion appears to be somewhat less than that of hypertonic saline. Hence, Craft and Musa (1971) utilised concomitant intravenous oxytocin infusion to reduce the injection-abortion interval.

The above mentioned different solutions and different methods were employed in the 400 women who had reported for midtrimester pregnancy termination. Ninety-six women were induced with 20% saline injected by the abdominal route, and 82 by the transcervical route. Transabdominal instillation of 40% urea was employed for 120 cases and in 78 cases concomitant intravenous oxytocin

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infusion was tried. Transcervical instillation of 40% urea was preferred in 24 cases. Detailed analysis of the efficacy, safety, acceptability and complications of the different technics form the basis of this report.

Material and Methods

Four hundred women who reported for pregnancy termination in the mid-trimester (between 14 to 20 weeks) were selected for this study. Each case was carefully evaluated to exclude any cardiac, hepatic or renal disease. The following were the different technics employed (Table I).

was instilled in the same manner described for abdominal method.

3. Transabdominal instillation of 40% urea: The method is the same as described for saline. Two hundred ml of 40% urea (80 gms of urea) was instilled into the amniotic cavity. If she failed to expel in 48 hours, oxytocin infusion was started with 10 to 20 units.

4. Transcervical instillation of 40% urea: Two hundred ml of 40% urea was instilled in the same manner as described for saline.

5. Transabdominal instillation of urea (40%) concomitant oxytocin infusion: Immediately after the abdominal instilla-

TABLE I
Different Methods of Induction of Abortion

No.	Solution and method	No. of cases	Percentage
1.	20% saline — Transabdominal	96	24.00
2.	20% saline — Transcervical	82	20.50
3.	40% urea — Transabdominal	120	30.00
4.	40% urea — Transcervical	24	6.00
5.	40% urea — Transabdominal (with I.V. oxytocic infusion)	78	19.50
Total :		400	100.00

1. Transabdominal instillation of 20% saline: Abdominal paracentesis was performed midway between the fundus of the uterus and the pubic symphysis and a free flow of liquor was established. Varying quantity of 20% saline, total not exceeding 200 ml, was instilled into the uterine cavity. If no response was seen within 48 hours, intravenous oxytocic infusion was started with 10 units in 600 ml of 5% dextrose.

2. Transcervical instillation of 20% saline: After carefully sounding the cervical canal, the 18 gauge 6 inches needle was passed through the cervical canal to pierce the amniotic membrane. After establishing free flow of liquor 20% saline

of urea, oxytocin infusion was set in with 20 units in 600 ml of 5% dextrose. A total of 60 to 80 units of oxytocin was given on the day of induction.

The various indications for which pregnancy was terminated are given in (Table II).

The age group of the patients ranged from 14 to 43 years with a mean of 23.8 years. The parity range varied from 0 to 5, with the unmarried girls constituting 70% of the total (Table III).

After expulsion of the foetus, if the placenta was not delivered within 15 to 30 minutes, digital or instrumental evacuation was done. If the woman did not abort within 5 days, it was considered

TABLE II
Indications

No.	Indications	No. of cases	Percentage
1.	Humanitarian grounds (including alleged rape)	298	74.50
2.	Social grounds (including failure of contraception)	94	23.50
3.	Therapeutic grounds (medical indication)	8	2.00
4.	Eugenic grounds (suspected foetal anomaly)	nil	nil
Total		400	100.00

TABLE III
Marital Status of the 400 Women

No.	Marrital status	No. of cases	Percentage
1.	Unmarried girls	280	70.00
2.	Married women	120	30.00
Total		400	100.00

TABLE IV
Injection—Abortion Interval

No.	Method of Instillation	Mean	Range
1.	Saline — Transabdominal	32 hrs 38 mts	14 hrs—65 hrs
2.	Saline — Transcervical	36 hrs 18 mts	17 hrs—78 hrs
3.	Urea — Transabdominal	43 hrs 20 mts	7 hrs—110 hrs
4.	Urea — Transcervical	56 hrs 54 mts	33 hrs—97 hrs
5.	Urea — With Pitocin	26 hrs 58 mts	7 hrs—100 hrs
All methods		38 hrs 49 mts	7 hrs—110 hrs

TABLE V
Time Taken for Abortion

No. of days	Saline (abdominal)	Saline (cervical)	Urea (abdominal)	Urea (cervical)	Urea pitocin
0 — 1	35.50	12.50	30.00	nil	69.48
1 — 2	95.50	87.50	58.30	16.66	83.31
2 — 3	100.00	100.00	83.33	49.90	88.91
3 — 4	—	—	91.60	58.38	94.46
4 — 5	—	—	95.00	66.65	97.23
Missed abortion	nil	nil	5.00	33.34	2.77

TABLE VI
Complications of Hypertonic Solutions

Solution used	Haemorrhage	Sepsis	Retained placenta
20% Saline	7.86%	1.13%	5.61%
40% Urea	0.90%	1.80%	19.80%

as missed abortion and managed on the lines of missed abortion.

Results and Discussion

20% saline is found to be an effective abortifacient agent, and the mean instillation to abortion interval was 32 hours and 36 hours for the abdominal and transcervical methods respectively. There was no failure in this series. 95% of the transabdominal and 87% of the transcervical instillations aborted within 48 hours, and all patients aborted within 72 hours. Oxytocin was avoided altogether or used only when contractions failed to occur after 48 hours. According to Goodlin (1971), Mackenzie *et al* (1971) and Schulman and Laresen (1971), the average induction expulsion time for saline of 34.6 hours can be reduced to 23.5 hours by the early use of oxytocin. This regime was not favoured in the present study, since it is believed that the concomitant use of oxytocin increases the incidence of consumptive coagulopathy (Cohen and Ballard, 1974). It may be because many patients are made to abort in the critical period of between 10 to 20 hours of instillation, when the changes in the maternal coagulation system are at its peak (Stander, 1971).

Transcervical instillation of saline is essentially an atraumatic procedure and the risk of intraperitoneal or intravascular injection of saline is negligible. The patient appreciates the advantages of avoiding the painful abdominal injection. When the abdominal technic is employed the peritoneal irritation and tenderness is al-

ways present. Other complications of transabdominal amniocentesis are bladder injury, trauma to the intestines and uterine perforation (Fuchs, 1967). These traumatic problems were absent in this series. The advantages of the transcervical method more than compensates for the minimal increase in the injection abortion interval.

Severe haemorrhage is a dreaded complication of saline abortions. Incidence of severe haemorrhage requiring blood transfusion is variously reported as 2.5% (Wagner *et al*, 1962), 4% (Gillmen *et al*, 1971), 6% (Frigoletto and Pokoly, 1971) and 2.3% (Stim, 1972). In the present series the incidence of haemorrhage requiring blood transfusion was 7.8%. To reduce the incidence of placental haemorrhage evacuation is performed, if the placenta is not expelled within 15 to 30 minutes of passage of the foetus. Yet another aetiological factor that operates is coagulation failure which manifests as consumption coagulopathy (Beller *et al*, 1972) or disseminated intravascular coagulation due to release of tissue thromboplastin (Stander *et al*, 1971). It is feared that the underlying cause of coagulation defect is hypernatraemia. However, the other life threatening complications of hypernatraemia, namely hypotension, cardiorespiratory embarrassment, convulsions and coma, were not associated with the present series of saline abortions.

Because of the potential hazards of saline, urea was employed in 222 patients. Urea has inherent safety factors,

notably its ability to be injected either intravenously or intraperitoneally without adverse effects. Its efficacy in inducing abortion appears to be somewhat less than that of hypertonic saline. Transcervical instillation of urea resulted in a prolonged induction abortion interval of 56 hours and 58 minutes (mean) and greater failure rate of 33.34%, and hence is not to be advocated for routine practice.

The mean induction abortion interval for transabdominal instillation of urea was 43 hours and 20 minutes, with a range of 7 hours to 110 hours. About 58% of women aborted within 48 hours and 83% within 72 hours. After 3 days the expulsion rate was very slow with a failure rate of 5%. The efficacy of urea can be enhanced by the concomitant use of oxytocin (Crafts and Musa, 1971; Greenhalf, 1971; Weinberg *et al*, 1975). About one hour after the instillation of urea the oxytocin induction is started, with 20 I.U. of pitocin in 600 ml of 5% dextrose, run at a rate of 30 to 40 drops per minute; 60 to 80 units of pitocin are administered at this rate. There is no problem of water intoxication since the antidiuretic effect of pitocin is well compensated by the osmotic diuresis produced by hypertonic urea. Early use of pitocin reduced the induction abortion time of urea to 27 hours and 58 minutes. By aborting more number of patients (about 70%) within 24 hours this method helps to reduce the hospital stay and cost to the patient. Pitocin has enabled to reduce the failure rate of urea from 5% to 2.77%. One of the concerns with this regime is that a high dose of oxytocin imposes a risk of hyponatraemia (Weinberg *et al*, 1975) which can be managed by using dextrose in saline for infusion of oxytocin.

Severe haemorrhage, as a complication of urea induced abortions, was seen only on two occasions (0.90%). Sepsis rate was very low (1.80%) and is comparable to that of saline (1.13%). One of the problems of urea is the high incidence of placental retention (19.80%) and hence operative intervention for removal of the placenta was somewhat higher in this study. Whereas the failure rate with transcervical instillation of urea was very high (33.34%), transabdominal instillation gave favourable results with a failure rate of 5% and that too was considerably minimised to 2.77% by the early use of oxytocin. Since the size of uterus was small in all cases of missed abortions (urea failures), surgical evacuation of the uterus could be effected, sometimes with the help of laminaria tents. The inconvenience of surgical intervention for missed abortions and retained placenta is offset by the safety of urea and its comparable efficacy especially when combined with oxytocin.

Whereas urea is considered to be extremely safe as an abortifacient agent, certain complications comparable to that of saline have been recently documented. Inadvertent injection of urea into the myometrium, just as saline, is proved to result in muscle necrosis, as demonstrated by Parmley *et al* (1976) in Rhesus monkeys. Recent literature also indicate the potentiality for coagulation defects in urea induced abortions. Burnett *et al* (1975) have demonstrated a fall in fibrinogen concentration by approximately 15%, after 8 hours of instillation of urea, and the lowest level recorded is 145 mgms. The mean platelet count showed a drop of approximately 18% and the fibrinogen-fibrin degradation products (FDP) were significantly elevated in 36% of the patients. MacKenzif

and Limda (1975) reported changes consistent with intravascular coagulation (rise in F.D., fall in plasma fibrinogen and reduction in platelet count) in patients aborted with Prostaglandin E₂ in combination with hypertonic urea. Similar changes could not be demonstrated when prostaglandin was used alone or in combination with glucose.

Summary

Four hundred midtrimester pregnancy terminations were effected by employing different solutions and different methods. While saline is accepted to be an effective abortifacient, urea is preferred for its inherent safety factors. Concomitant use of oxytocin, at the expense of no additional risk, enhance the efficacy of urea, comparable to that of saline. Urea also is associated with coagulation defects, though to a lesser degree.

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