

MONOAMNIOTIC TWINS

RAGNA FOGLMANN

Department of Obstetrics, St. Joseph Hospital and Frederiksberg Hospital, Copenhagen, Denmark

Six new cases of monoamniotic twins are reported. All had true knots of the cord, the result being double survival in 5 cases and 11 normal children. The mechanism of twin development is described and monoamniotic twins are placed in accordance with the two theories from the literature. A short review of both the Scandinavian and the world cases is presented.

Monoamniotic twin pregnancy is a rare condition which occurs when twins are contained in a single sac. This condition was first described by Boccalini in 1612 and by Justinen Sigimundin in 1690, but Mauriceau-Levret and Baudeloque denied it. Since then, 244 have been described in the world literature, and only 12 in the Scandinavian literature from 1922-1970.

The different types of twins are illustrated in Fig. 1. The upper two show a four-leaved membrane both in the identical and fraternal twins. The chorion membrane can be so delicate in both types that it is only visible at the microscope.

MZ twins are developed by early duplication in four different ways (see Figs. 1-3): (1) early division, one day after conception, results in dichorionic twins; (2) division in the blastocyst stage, from the first to the seventh day after the conception, results in monochorionic diamniotic twins; (3) division from the seventh to the thirteenth day results in *monoamniotic twins*; and (4) after the thirteenth day, the division would be incomplete resulting in conjoined twins — the mildest form consisting in a common cord, but otherwise two separate individuals.

There are two theories on the etiology of monoamniotic twins: one based on inborn factors (Corner 1955) and another on acquired ones, consisting in a disruption of the dividing membrane, usually early in the pregnancy, but in one of our cases so late that the rest of the dividing membrane can be seen as a plica (Fig. 4).

Theoretically there may be monoamniotic DZ twins, as reported by Pickering (1946): the twins, a boy and a girl in a single sac, with two separate placentas and no knots of the cords. A case of monoamniotic unlike-sexed twins (Guldberg 1938), a normal girl and a severely malformed fetus, was later invalidated by Trolle (1958) with the aid of sex-chromatin-testing.

The incidence of monoamniotic twins, as shown by Simonsen's (1966) summarizing table (Fig. 5), appears to widely vary. Double survival has considerably increased, as can be seen by Table 1, listing the classical serial descriptions since 1935. The 18 Scandinavian cases now have a double survival of 50% (Table 2).

The only way of diagnosing this condition prior to delivery is amniography; two cases are described in literature (Dunnihoo and Harris 1966, Hollander 1970). At the time of delivery, the diagnosis is made by noting the absence of a second amniotic sac and, in some cases, the twisting and knotting of the umbilical cords, and finally a placenta with no dividing membrane.

The prognosis for the monoamniotic twins is poor. They have the highest fetal mortality in twins, one cause being prematurity, another the vascular anastomoses in placenta, and, not least, the twisting and knotting cords presented in 60% of the cases described. When the first twin is born, the second

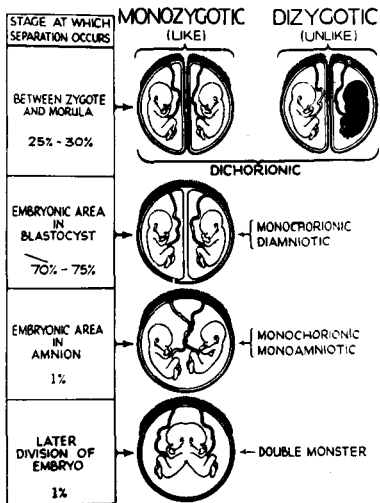


Fig. 1. The different types of twins. (From Morison 1952).

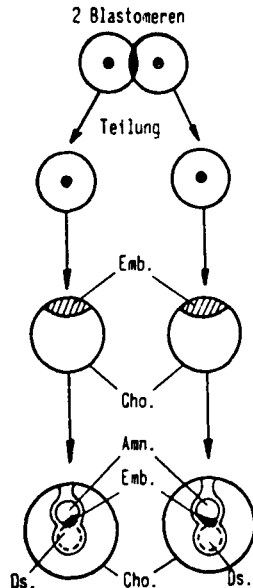


Fig. 2. Origin of dichorionic twins. (From Corner modified by Simonsen).

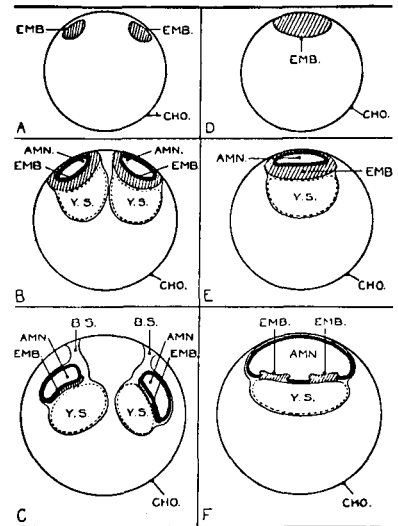


Fig. 3. Origin of monoamniotic diamniotic (A-C) and monoamniotic twins (D-F). (From Corner 1955).

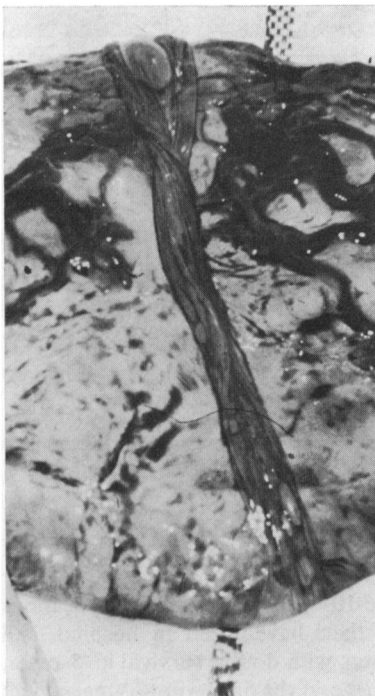


Fig. 4. Placenta with the rest of dividing membrane.

Marner Simonsen

Table I. Comparison of Incidence of Monoamniotic Twin Pregnancy

Author	Ratio of Monoamniotic Twins to Total Pregnancies	Ratio of Monoamniotic Twins to Twin Deliveries
Ahlefeld	1: 16,000	1: 169
Aigner	1: 7,000	
Rosenberg	1: 60,000	1: 700
Müller	1: 6,000	1: 70
Alfieri		1: 256
Acoste-Sison	1: 93,734	1: 661
Librach et Terin	1: 4,000	1: 65
Raphael	1: 16,000	1: 165
Trolle	1: 1,700	1: 33
Leroy	1: 16,000	
Wensinger	1: 3,071	
Coplerud	1: 40,000	1: 400
Present study	1: 1,650	1: 52

Fig. 5. Incidence of monoamniotic twins. From Simonsen 1966.

Table 1. *Double survival in monoamniotic twins*

Author	Year	Cases	Double survival n	Double survival %
Quigley	1935	109	17	16
King et al.	1952	148	30	20
Craig and Joplin	1957	166	40	24
Raphael	1961	183	51	28
Pauls	1969	224	73	33
	1972	244	84	36

Table 2. *Scandinavian cases of monoamniotic twins*

Author	Year	Cases	Double surv.	Single surv.	D. stillb. Perin. d.	Cord knots
Pers	1922	1	?	?	?	?
Simon	1926	1	?	?	?	?
Guldberg	1938	1		1		
Henrichsen	1946	1			1	1
Trolle	1958	4	1	1	2	1
Simonsen	1966	2	2			1
Moestrup	1970	2	1		1	
	1972	6	5	1		6

Table 3. *Personal cases of monoamniotic twins*

No.	Year of birth	Maternal age	Para	Grav.	Sex	Presentation	Delivery	Interval (min)	Weight (g)
1	1963	35	II	II	- F	capitis sincip.	Stim. lab. med.	10	2000 2000
2	1969	21	I	II	FF	occ. p. a. natum.	Sectio caesarea sub partu.	5	2350 2800
3	1969	25	II	II	MM	occ. p. a. occ. p. a.	Stim. lab. med.	5	2400 2100
4	1969	22	I	II	MM	occ. p. a. natio-ped.	Stim. lab. med. Extr. f. incomp.	10	2350 2100
5	1969	25	I	II	FF	occ. p. a. occ. p. a.	Vacuum rxtr. Forceps in s.dp.	5	2450 2550
6	1971	24	II	III	MM	occ. p. a. capitis	Stim. lab. med. Auxilium man.	15	2900 2550

must be delivered as soon as possible. The delivery may depend on a certain obstetrical sleight of hand.

Our own 6 cases are described in Table 3 and illustrated in Figs. 6-10. There were no complications before birth. The diagnosis of twins was made in 5 cases: all of them have rested in hospital. All cases had true knots of the cords, the result being 11 normal children, with double survival in 5 cases, all delivered after 37 weeks. In case number 1, delivered at the 36th week, the first twin was macerated.

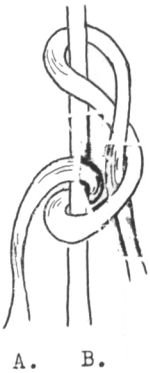


Fig. 6. True knots from case 1.

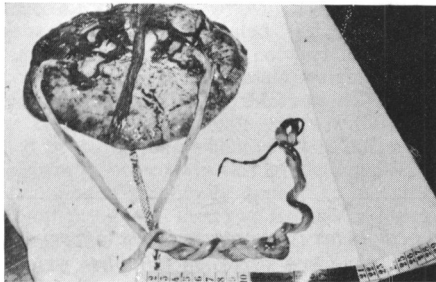


Fig. 7. Case 3. Placenta with the rest of dividing membrane and plait.

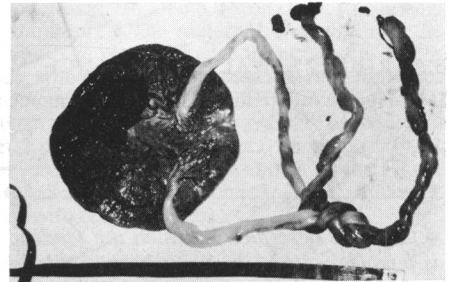


Fig. 8. Placenta from case 4.

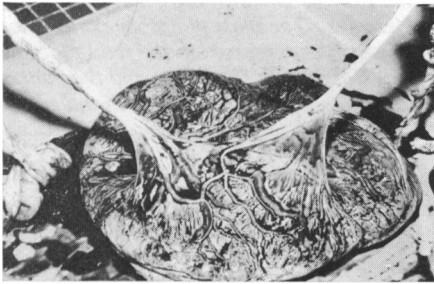


Fig. 9. Placenta from case 6.

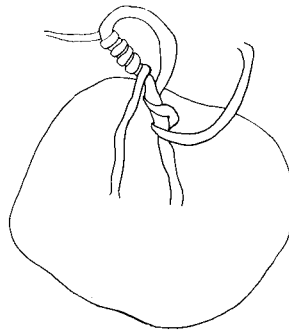


Fig. 10. Obstetrician's drawing of placenta from case 6, showing intertwining of cords.

REFERENCES

Corner G.W. 1955. The observed embryology of human singleovum twins and other multiple births. *Am. J. Obstet. Gynecol.*, 70: 933-951.

Craig E.T., Joplin M. 1957. Monoamniotic twins with double survival. *Am. J. Obstet. Gynecol.*, 73: 202-205.

Dunnihoe D.R., Harris R.E. 1966. The diagnosis of monoamniotic twinning by amniography. *Am. J. Obstet. Gynecol.*, 96: 894-895.

Guldberg E. 1938. Verschiedengeschlechtige eineiige Zwillinge. *Acta Pathol. Microbiol. Scand.*, Suppl. 37: 193.

Hollander H.J. 1970. Monoamniotische Zwillinge. King J.A., Herring J.S., Witt E.D., Blood B. 1952. Monoamniotic twin pregnancy. *Am. J. Obstet. Gynecol.*, 63: 691-694.

Moestrup J.K. 1970. Monoamniotic twins. *Acta Obstet. Gynecol. Scand.*, 49: 85-87.

Morison J.E. 1952. *Foetal and Neonatal Pathology.* London: Butterworth.

Pauls F. 1969. Monoamniotic twin pregnancy. *Can. Med. Assoc. J.*, 100: 254-256.

Pickering G.H. 1946. Monoovular twins (of different sex). *Br. Med. J.*, 2: 988.

Quigley J.K. 1935. Monoamniotic twin pregnancy. *Am. J. Obstet. Gynecol.*, 29: 354-362.

Raphael S.I. 1961. Monoamniotic twin pregnancy. *Am. J. Obstet. Gynecol.*, 81: 323-330.

Simonsen M. 1966. Monoamniotic twins. *Acta Obstet. Gynecol. Scand.*, 45: 43-49.

Trolle D. 1958. Monochoriale monoamniotische eineiige Zwillinge. *Nord. Med.*, 59: 191-193.

Dr. Ragna Foglmann, Vestergade 20. II. 1456 Copenhagen, Denmark.