TROCHANTERIC FRACTURES OF THE FEMUR TREATED BY THE VITALLIUM McLAUGHLIN NAIL AND PLATE

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From 1952 onwards all patients admitted to the Accident and Orthopaedic Service of the Singapore General Hospital with trochanteric fractures were assessed by the surgeon, anaesthetist and physician with a view to internal fixation by means of a McLaughlin nail plate. The original pattern vitallium McLaughlin nail plate with the quarter inch set screw was used.

The operation was carried out at the next (twice weekly) operative session, but when necessary a few days were spent in preparative medical treatment, usually with benefit.

The average time between operation and admission was 7 days.

Russel traction was routinely applied before operation.

CLINICAL MATERIAL

This study is based on 123 fractures treated operatively over a 6 year period 1952 to 1967 inclusive, in the Department of Orthopaedic Surgery of the University of Singapore. The patients were Chinese, Indians and Malays. Seventy four were males and forty nine were females. The male to female ratio is therefore 3:2 in favour of the males (Table I).

Excluded are fractures which were essentially subtrochanteric, those which were seen late, cases who refused operation, and those who were moribund on admission.

Although 123 cases were fixed by means of the McLaughlin nail plate only 83 cases were available for long term follow up 6 months or more. Thirty of the cases could not be traced. This high proportion (24%) lost to follow up is due to the extensive urban renewal programme still in progress in the Republic. There were 10 hospital deaths (8%) in the series (Table II).

TABLE II

Full Follow Up Possible	83
No Follow Up Possible	30
Deaths	10
TOTAL	123

Classification of Fractures

The classification originally suggested by Evans (1949) was employed. The incidence of the different types of fractures is shown in (Table III).

TABLE III

TYPES OF FRACTURE

		Males	Females	Percent Males	Percent Females
Type I	Stable	46	34	62.1	69.4
	Unstable	21	11	28.4	22.5
Type II	Unstable	7	4	9.5	8.1

TABLE I

AGE DISTRIBUTION AND MORTALITY

	31-40	41-50	51-60	61-70	71-80	81+	Total	Percent	Average Age
Number of Patients:									
Males	5	7	10	27	16	6	71		64
Females	0	1	3	10	17	11	42		73
Hospital Deaths:									
Males	0	0	0	1	2	0	3	4.0%	73
Females	0	0	0	0	5	2	7	14.3%	78

Mortality

Ten patients died within the first 2 weeks postoperatively and before they were discharged from hospital. The overall mortality rate is therefore 8%. This is the same as that quoted by Evans (1951) and is certainly better than the 16.6% calculated by him from a survey of 8 reported series. Kennedy, McFarlane and McLachlin (1957) had a mortality of 18.8% with the Moe Plate. Foster (1958) reported a mortality rate of 9% with the McLaughlin Nail Plate.

The causes of death are shown in Table IV. The main cause only is given; multiple contributary factors were usually present.

TABLE IV

PRINCIPAL CAUSES OF HOSPITAL DEATHS

No. of Case		Cause of Death
Males	Females	
1	3	Bronchopneumonia
0	2	Cerebral Vascular Accident
0	1	Electrolyte Imbalance (Diarrhoea)
1	0	Diabetic Coma
1	0	Bleeding from Gastro Intestinal Tract

Of the 10 deaths 7 (14.3%) were women, and 3 (4%) were men.

The average ages of the cases who died exceeded those of the series as a whole.

Technical Complications

These included the bending of the nail, penetration of the nail into the joint space, failure of the nail plate junction and loosening of the plate. The incidence of such complications are indicated in Table V. The overall nail plate junction and plate disruption for the series is 21.6%. Though this is very unsatisfactory the incidence is still lower than the 32% experienced by McLaughlin (1955). Disruption, however, varied with the fracture type being the lowest with the type I stable injuries 14.3% and extraordinarily high in the type I unstable and type II fractures, being 32% and 33.3% respectively (Table VI).

Removal of the Nail Plate

Only 13 of the 83 nail plates were removed i.e. an incidence of 15.7%. Many more should have been dismantled. Consent however could not be obtained for a second operation in many cases.

Late Results

Eighty three cases were available for complete assessment. The minimum follow up period was 6 months and the longest was 6 years (Table VII). Four gradings, functional and anatomical were used corresponding to those used by Foster (1958), Kennedy *et al* (1957) and Murray and Frew (1949).

Functional grading:

Grade 1: Poor—bed-ridden or confined to a chair.

Grade 2: Fair—requires a stick or crutches, considerable limp or pain.

Grade 3: Good—walks well, uses stick to go out. Only slight limp or pain.

Grade 4: Excellent—walks as well as before the operation. No limp or pain.

Anatomical grading:

Grade 1: Poor—severe mal union. Varus deformity of 25 degrees or more, or over an inch of shortening.

Grade 2: Fair—Union with 10-25 degrees of varus and half an inch to one inch of shortening.

Grade 3: Good—Union with less than 10 degrees of varus and minimum of shortening.

Grade 4: Excellent—Union in perfect position.

If grades 3 and 4 are regarded as satisfactory, the proportion of satisfactory results compares well with other series (Table VIII). In more detailed analysis, however, both functional and anatomical results vary considerably according to the fracture type. Functional grading is satisfactory in the stable I and type II injuries but it is only fair in the stable type I injuries. Anatomical end result in the stable type I injuries is excellent, it is very poor in the type II injuries and it is even worse in the type I unstable members (Table IX).

TABLE V

MECHANICAL FAILURE

	Type I				Type II		
	Stable		Unstable				Percent
	M	F	M	F	M	F	
Bending of Nail	0	0	2	1	0	0	3.6
Penetration of Joint Space	2	2	0	2	0	0	7.2
Loose Plate	1	0	1	0	1	0	3.6
Failure of Nail Plate Junction	3	3	5	2	2	0	18.1
Percent Mechanical Failure	—	—	—	—	—	—	32.5

TABLE VI

NAIL PLATE JUNCTION, PLATE DISRUPTION: COMPARISON OF RESULTS IN THREE SERIES:

Author	Stable I	Unstable I	Type II	All Types
Present Series	14.3%	32.0%	33.3%	21.7%
Foster (1958)	—	—	—	8.0%
McLaughlin (1955)	—	—	—	32.0%

TABLE VII

FINAL ASSESSMENT IN 83 CASES (MINIMAL FOLLOW-UP SIX MONTHS)

Grade	Functional Grading				Anatomical Grading			
	Type I		Type II	Total	Type I		Type II	Total
	Stable	Unstable			Stable	Unstable		
1	0	0	1	1	0	7	2	9
2	11	9	1	21	3	9	3	15
3	11	13	6	30	0	1	0	1
4	27	3	1	31	46	8	4	58
TOTAL	49	25	9	83	49	25	9	83

TABLE VIII

COMPARISON OF SATISFACTORY RESULTS IN FIVE SERIES OF CASES

Author	Satisfactory Functional Grading	Satisfactory Anatomical Grading
Present Series	73%	71%
Foster (1958) McLaughlin Nail Plate	78%	85%
Kennedy *et al* (1957) Moe Plate	69%	71%
Evans (1951) Capener	68%	74%
Murray and Frew Conservative	67%	62%

TABLE IX

	Stable I	Unstable I	Type I
Satisfactory Functional Grading	77.6%	64%	77.8%
Satisfactory Anatomical Grading	94%	36.0%	44.4%

Practically all of the 83 cases complained of pain or discomfort when lying on the side in which the nail plate was inserted. This is explained by the fact that patients in this part of the world are less protected by soft tissue in the trochanteric region than their European counterparts.

SUMMARY AND CONCLUSION

A series of 123 trochanteric fractures treated by fixation with the vitallium nail plate of the original McLaughlin pattern is described. The mortality rate is 8%.

Disruption of the nail plate junction and plate occurred in 14% of the stable type I fractures and more than 30% of the unstable injuries.

Satisfactory anatomical result in the stable type I injuries was 94%, 36% in the instable I and 44% in the type II injuries. This confirms McLaughlin and Garcia's (1955) view that this pattern of nail plate should no longer be used.

Despite the high disruption rate and poor anatomical end results, satisfactory functional grading was obtained in the stable type I and unstable type II injuries.

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