

Review of Surgical Management of Supratentorial Extra Dural Haematoma at LGH

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ABSTRACT

Introduction: Care of the head injured patient forms an important part of a neurosurgeon's work in all countries, and especially in developing countries, like ours. With increasing industrialization, increase in road traffic accidents, the incidence and severity of head injury is increasing. Of all the potentially lethal complications of head injury, extradural haematoma (EDH) is the most readily diagnosed and remediable.

The Objectives: To review the surgical management of Supratentorial EDH, at our Department.

Study Design: Retrospective Review.

Setting: Department of Neurosurgery, Lahore General Hospital / PGMI, Lahore.

Materials and Methods: This is a retrospective case series of 1536 patients of Supratentorial EDH who were treated surgically between Jan 2005 and Dec 2009. Patients' medical records were reviewed to define variables associated with outcome at the time of discharge. Variables included in the analysis were time since injury, age, gender, severity of head injury, anatomical site of hematoma on CT scan and outcome at the time of discharge (Glasgow Outcome Scale). Patients harbouring extra-cranial injuries which required operative management by other departments, e.g. laprotomy, thoracotomy, chest intubation and cases having associated brain parenchymal injury requiring intervention, were excluded.

Results: In our study of 1536 patients the mean age was 20.46 years, the minimum age was 5 and maximum 60 years. The age range was 55 years. Out of the total 1536 patients 1068 i.e. 69.5% were male and only 468 i.e. 30.5% were females. Male to female ratio was 2.29 : 1. Patients presenting with Mild Injury was the largest group. 664 out of 1536 (n) i.e. 43.2% were having a score of GCS from 13 – 15. The 2nd was patients with GCS score 9 – 12 i.e. moderate injury groups. 516 out of 1536 (n) i.e. 33.6%, presented with GCS Score ranging from 9 – 12. Patients having severe head injury, presenting with GCS from 3 – 8 was the smallest group. Only 356 out of 1536 (n) i.e. 23.2% were in this group. In Majority of the patients' time since injury was from 6 to 12 hours, i.e. 732 out of 1536 (n) making 47.7%. Patients reaching within 6 hours were the 2nd largest group, i.e. having 485 patients making 31.6% of the total n = 1536. Only 319 patients i.e. 20.8% were those who reached after 12 hours of injury. As of the site of EDH, in our study of 1536 patients, Frontal region Hematomas was the most frequent ones. 406 out of the total 1536 (n) i.e. 26.4% Hematomas operated in our study was at frontal region. Tempo-Parietal was the 2nd largest group having 347 patients i.e. 22.6% of the total 1536 (n) EDH'S operated. Fronto-Parietal region was the 3rd frequent site having 194 patients i.e. 12.6% of n = 1536. Parietal location was the 4th frequent in order of frequency having 156 patients i.e. 10.2% (n = 1536). There were 122 patients out of 1536 (n) i.e. 7.9% having Occipital location of the EDH. Only 90 patients out of 1536 (n) i.e. 5.9% were having temporal Hematomas in our study. Patients having large Fronto-Parieto-Temporal Hematomas were only 5.5% i.e. 84 out

of 1536 (n). At 1 week Post-Operatively 738 patients out of 15360 (n) i.e. 48 % were having Good Recovery. 491 out of 1536 (n) i.e. 52% were in Moderate Disability group. 236 out of 1536 (n) i.e. 20% patients were severe disability group when assessed with Glasgow Outcome Scale. 71 out of 1536 (n) i.e. 4.6% were dead.

Conclusions: The surgical management of EDH is a rewarding and life saving procedure and young male population seems to be a vulnerable population group.

Key Words: Head Injury; Supratentorial Extradural Hematoma; Surgical Evacuation of EDH.

Abbreviations: EDH: Extradural Hematoma, GCS: Glasgow Coma Scale, GOS: Glasgow Outcome Scale.

INTRODUCTION

Care of the head injured patient forms an important part of a neurosurgeon's work in all countries, and especially in developing countries, like ours. With increasing industrialization, increase in road traffic accidents, the incidence and severity of head injury is increasing. As many as 100,000 patients per year may require surgical management for a posttraumatic intracranial hematoma in the United States alone. For these reasons, the impact that neurosurgeons can have on the care of such patients is enormous, and perhaps, more than in any other area of emergency medicine, the aggressiveness and rapidity with which care is provided for an intracranial hematoma will determine the outcome.¹

It has been² reported in literature that craniotomy for evacuation of an acute epidural hematoma is one of the most cost-effective of all surgical procedures. For this particular subgroup, which may represent up to 5% of patients with severe and moderate TBI, the quality of outcome has been shown to vary dramatically among different hospitals with different levels of commitment to acute neurotrauma care.³⁻⁵ It is for this reason, more than any other, that neurosurgical consultation in the Emergency Room should be promptly available and is a mandated requirement for Level I certification of Trauma centers.⁶ Although there is evidence that posttraumatic intracranial mass lesions have been removed surgically up to 4000 years ago by the Egyptians and Meso – Americans, it was not until a series of publications emerged in the late 1960s that it became generally accepted that excellent results could be achieved with craniotomy for removal of extradural hematomas.⁷

For acute subdural hematomas and intraparenchymal lesions, such as contusions and traumatic intracerebral hematomas, the outcome has historically been much worse, because up to 60% of patients with acute subdural hematomas will die or remain severely disabled.⁸ Of all the potentially lethal complications of head injury, extradural haematoma is the most readily diagnosed and remediable.⁹

Dept of Neurosurgery Lahore General Hospital / PGMI, is a tertiary care centre for Neurosurgical Disorders and a large number of patients with head injury are managed each year. So we reviewed the patient charts of a subgroup of surgically managed Extradural Hematomas.

MATERIALS AND METHODS

A chart review of Head Injury patient records of last 5 years i.e. 2005 to 2009 was conducted at the Dept of Neurosurgery LGH – PGMI. Patients admitted as Head Injury with Supratentorial Extradural Hematomas managed by surgical evacuation were filtered. Patients' medical records were reviewed to define variables associated with outcome at the time of discharge. Variables included in the analysis were time since injury, age, gender, severity of head injury, anatomical site of hematoma on CT scan and outcome at the time of discharge (Glasgow Outcome Scale). Exclusion criteria were used to further filter the patients. Data was analyzed by using SPSS. Results are presented as Description, Tables and Charts.

Inclusion Criteria:

- Supratentorial Epidural Hematomas who were surgically managed by evacuation.
- Age range from 5 to 60 years.
- Presentation within 24 hours of injury.

Exclusion Criteria

- Bilateral Hematomas.
- Patients having significant Brain injuries e.g. Contusions, ICH, IVH associated with EDH (According to Pre-Op CT Scan).
- Patients undergoing Operative management of Extra-cranial Injuries, i.e. Laprotomy, Chest Intubation, Limb Fractures.
- Patients having documented, disturbed Coagulation profile.
- Recurrent hematomas.

RESULTS

Age Incidence

In our study of 1536 patients the mean age was 20.46 years (Tab 1 & 3), the minimum age was 5 and maximum 60 years. The age range was 55 years Graph 1).

Table 1: Statistics Age.

N	Valid	1536
	Missing	0
Mean		20.4674
Std. Deviation		11.9843
Range		55.00
Minimum		5.00
Maximum		60.00

Sex Incidence

Out of the total 1536 patients 1068 i.e. 69.5% were male and only 468 i.e. 30.5% were females. Male to female ratio was 2.29 : 1 (Tab – 2, Graph – 2).

Table 2: Gender.

	Frequency	Percent	Cumulative Percent
Male	1068	69.5	69.5
Female	468	30.5	100.0
Total	1536	100.0	

Clinical Presentation – GCS

Patients presenting with Mild Injury was the largest group. 664 out of 1536 (n) i.e. 43.2% were having a score of GCS from 13 – 15. The 2nd group was patients with GCS score 9 – 12 i.e. moderate injury groups and 516 out of 1536 (n) i.e. 33.6%, presented with GCS Score ranging from 9 – 12. Patients having severe head injury, presenting with GCS from 3 – 8 was the smallest group. Only 356 out of 1536 (n) i.e. 23.2% were in this group (Tab – 4, Graph – 3).

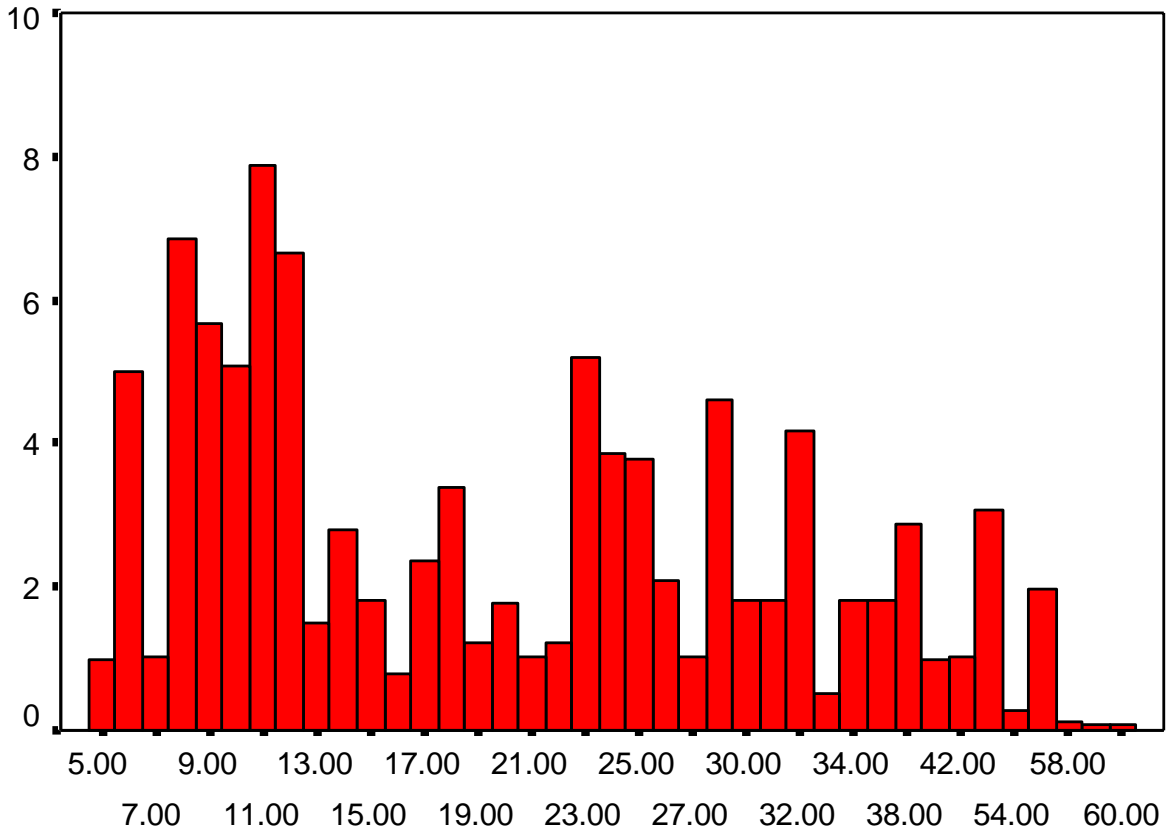
Table 4: GCS at admission.

	Frequency	Percent	Cumulative Percent
13 – 15	664	43.2	43.2
9 – 12	516	33.6	76.8
3 – 8	356	23.2	100.0
Total	1536	100.0	

Table 3: Age.

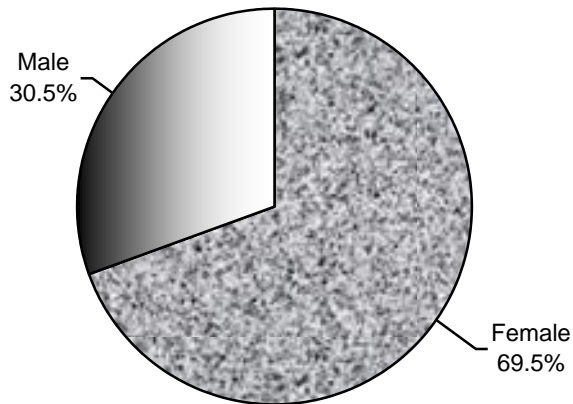
Years	Frequency	Percent	Cumulative Percent
5.00	15	1.0	1.0
6.00	77	5.0	6.0
7.00	16	1.0	7.0
8.00	105	6.8	13.9
9.00	87	5.7	19.5
10.00	78	5.1	24.6
11.00	121	7.9	32.5
12.00	102	6.6	39.1
13.00	23	1.5	40.6
14.00	43	2.8	43.4
15.00	28	1.8	45.2
16.00	12	.8	46.0
17.00	36	2.3	48.4
18.00	52	3.4	51.8
19.00	19	1.2	53.0
20.00	27	1.8	54.8
21.00	16	1.0	55.8
22.00	19	1.2	57.0
23.00	80	5.2	62.2
24.00	59	3.8	66.1
25.00	58	3.8	69.9
26.00	32	2.1	71.9
27.00	16	1.0	73.0
28.00	71	4.6	77.6
30.00	28	1.8	79.4
31.00	28	1.8	81.3
32.00	64	4.2	85.4
33.00	8	.5	85.9
34.00	28	1.8	87.8
35.00	28	1.8	89.6
38.00	44	2.9	92.4
41.00	15	1.0	93.4
42.00	16	1.0	94.5
45.00	47	3.1	97.5
54.00	4	.3	97.8
56.00	30	2.0	99.7
58.00	2	.1	99.9
59.00	1	.1	99.9
60.00	1	.1	100.0
Total	1536	100.0	

AGE

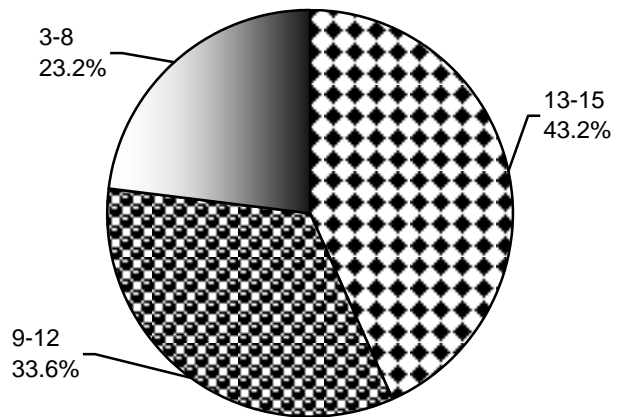


AGE

Graph 1:



Graph 2: Gender.



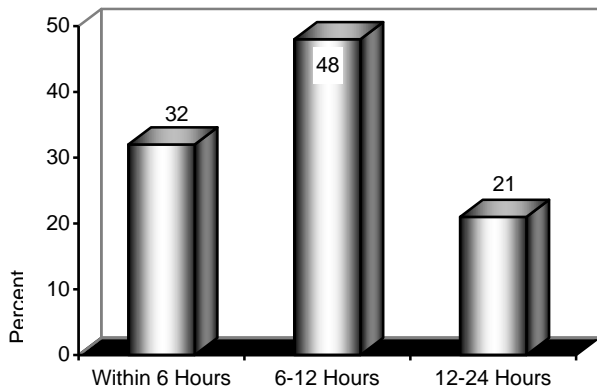
Graph 3: GCS at admission.

Time Since Injury

In Majority of the patients’ time since injury was from 6 to 12 hours, i.e. 732 (47.7%) out of 1536 (n). Patients reaching within 6 hours were the 2nd largest group, i.e. having 485 (31.6%) patients. Only 319 (20.8%) patients i.e. were those who reached after 12 hours of injury (Tab – 5, Graph – 4).

Table 5: Time Since Injury.

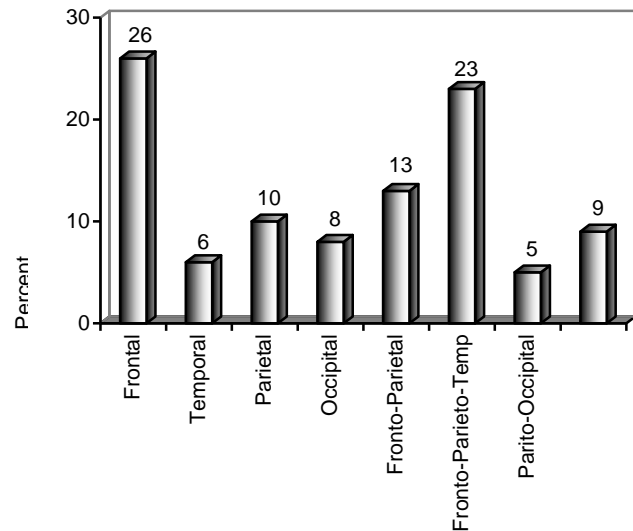
	Frequency	Percent	Cumulative Percent
Within 6 Hours	485	31.6	31.6
6 – 12 Hours	732	47.7	79.3
12 – 24 Hours	319	20.8	100.0
Total	1536	100.0	



Graph 4: Time Since Injury.

Table 6: Hematoma Site

	Frequency	Percent	Cumulative Percent
Frontal	406	26.4	26.4
Temporal	90	5.9	32.3
Parietal	156	10.2	42.4
Occipital	122	7.9	50.4
Fronto-Parietal	194	12.6	63.0
Tempo-Parietal	347	22.6	85.6
Fronto-Parieto-Temp	84	5.5	91.1
Parito-Occipital	137	8.9	100.0
Total	1536	100.0	



Graph 5: Haematoma Site.

Site of EDH

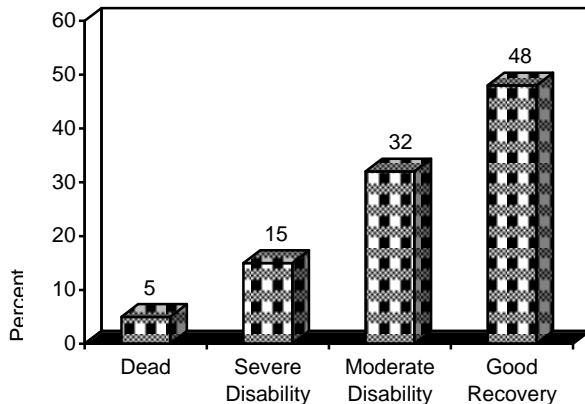
In our study of 1536 patients, Frontal region Hematomas was the most frequent ones. In 406 (26.4%), Tempo-Parietal was the 2nd largest group having 347 (22.6%). Fronto-Parietal region was the 3rd frequent site having 194 (12.6%) patients. Parietal location was the 4th frequent in order of frequency having 156 (10.2%) patients. There were 122 (7.9%) patients out of 1536 (n) having Occipital location of the EDH. Only 90 patients out of 1536 (5.9%) (n), were having temporal Hematomas in our study. Patients having large Fronto-Parieto-Temporal Hematomas were only 5.5% i.e. 84 out of 1536 (n) (Tab – 6, Graph – 5).

Table 7: GOS at 1 Week Post-Operatively.

	Frequency	Percent	Cumulative Percent
Dead	71	4.6	4.6
Severe Disability	236	15.4	20.0
Moderate Disability	407	32.0	52.0
Good Recovery	738	48.0	100.0
Total	1536	100.0	

Outcome

At 1 week Post-Operatively 738 patients out of 15360 (n) i.e. 48 % were having Good Recovery. 491 out of 1536 (n) i.e. 52% were in Moderate Disability group. 236 out of 1536 (n) i.e. 20 % patients were severe disability group when assessed with Glasgow Outcome Scale. 71 out of 1536 (n) i.e. 4.6 % were Dead (Tab – 7, Grph 6).



Graph 6: GOS at 1 Week Post-Operatively.

OBSERVATIONS

The majority of the patients suffering were from young age groups. Two peak patterns were observed from 6 to 12 years of age and then 22 to 29 years age groups. About 80 % patients were below the age of 31 years (Tab – 2, Graph – 1). There was marked majority of males. The frequency of males were more than double than females.

Majority of the patients were rated as having mild head injury according to their GCS at the time of presentation. Patients presenting with Severe injury i.e. GCS 3 – 8 was the smallest group (Tab – 4, Graph – 3). Frontal and parietal regions were involved in majority of the patients and about 40% patients had mixed site like fronto-parietal, tempo-parital (Tab – 6, Graph – 5). Majority of our patients presented at least 6 hours after their injury i.e. 6 – 12 hours. Patients presenting within 6 hours of their injury was the second largest group (Tab – 5, Graph – 4). At 1 week Post-Operatively majority of the patients were having good recovery and were discharged. Second in frequency were moderately disabled patients. Only a small number of deaths had occurred till 1 – week post-operatively (Tab – 7, Grph 6).

DISCUSSION

The results of our review clearly indicates that EDH seems to be a afflicting young male population, as nearly 80% of our patients were below the age of 31 years and majority were male. The mean age in our review is 21 years and there is sound evidence from literature that this is generally the case in majority of the studies.

The literature shows that the 2nd, 3rd and 4th decades are the most commonly affected age groups. In the classical series of Hooper⁹ 56% patients belonged to these three decades, while in the study of Phonprasert et al.,¹⁰ 76% patients were of these ages. The peak incidence was seen in the 2nd decade. In a recent study from Hong Kong Cheung et al¹¹ has reported in his study that the Seventy (79%) patients were male, with a mean age of 37.7 years.

In the recent African study of EDH Outcome Emejulu et al¹² has reported that majority of the patients were young, with mild head injury and good outcome.

In a recent Swiss TBI Outcome study the median age has been reported as 54¹³ but this study has included Acute Subdural Hematomas as well. In a recent Pakistani study of Outcome of Acute Traumatic Extradural Hematomas by Rehman L et al.¹⁴ Seven (23.3%) patients were below 10 years of age, and 9 (30%) patients were in the age range of 20 – 30 years. In a recent 10 years review of the demographics, symptoms and signs, management and outcome of patients less than 18 years of age with extradural haematomas, by Duthie et al¹⁵ has reported the mean age as 10 years.

It is rare in those over the age of sixty (probably as a result of the increased adherence of the dura to the inner table of the skull in the elderly, and in children in the first two years of life.¹⁶ The low incidence in adults may be due to the adherence of the dura to the suture lines.¹⁷ In a Local study the incidence of extradural hematoma in children below 15 years of age was found to be 2.5%.¹⁸

There was a marked majority of males in our review. Similar observations were found in other studies.⁹⁻¹⁵ The reason for this difference may be that males are more prone to trauma as they are more mobile and travel more for their day – to – day activities than females. The results of our study are quite comparable to the literature.

Traumatic extradural haematoma (EDH) is a neurosurgical emergency and timely surgical intervention for significant EDH is important. In Majority of the patients' time since injury was from 6 to 12 hours. Recently Bulters et al.¹⁹ conducted a prospective, single-

centre study of times to treatment of patients with life-threatening, traumatic, extra- and subdural haematomas requiring surgical evacuation. The mean time to surgical decompression was 5.0 h and 32% were performed within 4 h. Patients who initially presented to a district hospital and required transfer for neurosurgery were decompressed in 5.4 h vs 3.7 h for those admitted directly. The current standard of surgical evacuation of all haematomas within 4 h is not being met. Delays were identified in every stage in the management of these patients and no single step was identified as the major cause. Initial treatment in district hospitals led to delays greater than the added driving time. There may be time savings from carrying out treatment steps in parallel instead of in series.

Majority of the patients were rated as having mild head injury according to their GCS at the time of presentation. Patients presenting with Severe injury i.e. GCS 3-8 was the smallest group (Tab – 4, Graph – 3). In a recent large study from Hong Kong Cheung et al¹³ has reported that on admission, 62 (70%) patients were GCS 13 – 15, 9 (10%) GCS 9 – 12 and 18 (20%) GCS 3 – 8. Other studies has also shown a majority of Mild injury group at admission.⁸⁻¹²

Location of extradural hematoma is very important for both patient and the surgeon. It determines the prognosis as well as eases the surgeon to operate. Its location is more common in the distribution of middle meningeal artery and its branches.

Frontal and parietal regions were involved in majority of the patients and about 40% patients had mixed site like fronto-parietal, tempo-parietal (Tab – 6, Graph – 5). In Majority of the studies in recent and old literature Frontal or Tempo-Parietal location seems to be the favoured location of Supratentorial EDH'S.^{1,6,9,13}

At 1 week Post-Operatively majority of the patients were having good recovery and were discharged. Second in frequency were moderately disabled patients. Only a small number of deaths had occurred till 1 – week post-operatively (Tab – 7, Grph 6). The most widely used assessment of the outcome of patients after head injury is Glasgow outcome scale.²⁰ There is a strong correlation between the outcome and GCS²¹ Outcome is considered to be directly related to the patient's pre-operative neurological status and the presence of associated intracranial lesions.²²

CONCLUSION

The surgical management of EDH is a rewarding and life saving procedure and young male population seems to be a vulnerable population group.

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