

Suicide Attempts as the Cause of Post Intubation Airway Stenosis (PIAS)

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ABSTRACT

Background: The incidence of suicide attempt has been increasing in recent years. Presenting a group of patients who attempted suicide, underwent ventilatory support and developed postintubation airway stenosis (PIAS) may help us in prevention and better understanding of this complication.

Materials and Methods: Among patients who referred to our center for treatment of PIAS, those who had been intubated for suicide attempt were investigated in a prospective study. Information was entered in a questionnaire and regular follow ups were done in a 15-month period (April 2003 to July 2004).

Results: Among 100 patients with PIAS, 19 enrolled in this study including 10 females and 9 males (mean (\pm SD) age, 25.3 (\pm 9.96) yrs; ranging from 17 to 56 yrs). Type of disease and reasons of suicide were categorized by a psychologist as follows: Eleven patients with psychosocial stress along with an immature personality back-ground, 7 cases of psychological disorders and one with an unknown cause.

Direct causes of committing suicide included family problems in 10 cases, lovesick in 2, addiction in 3, depression in 6 and social problems in 2 cases (some patients mentioned two reasons and one refused to mention the reason).

Mean time of intubation was 14.78 days (3-30 days), and the mean length of stenosis was 35.12 mm (20-50 mm), 8 patients underwent tracheostomy. Three patients were treated with bronchoscopic dilation and 16 underwent laryngotracheal resection and reconstruction. There were 8 cases of recurrence after resection among which 4 were treated by second resection, 2 recovered by bronchoscopic dilation and 2 managed by stenting. This group of patients (study group) was compared with a similar group of patients in whom the causes of intubations were different (control group). Incidence of post-surgical recurrence ($p=0.011$) and the length of stenosis ($p=0.01$) were higher in the study group.

Conclusion: In our patients, social problems such as unemployment, illiteracy and singleness were the more frequent causes of suicide compared with psychological disorders. Patients who undergo mechanical ventilation due to suicide and develop PIAS could be treated by tracheal resection and reconstruction; although the incidence of post-surgical recurrence is higher in them compared with the other groups of patients with PIAS. (*Tanaffos* 2005; 4(15): 11-16)

Key words: Suicide, Post Intubation Airway Stenosis (PIAS), Suicide attempt

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INTRODUCTION

Suicide has a history as old as mankind. Unfortunately, incidence of suicide attempts has been increasing in recent years (1, 2, 3, 4, 5, 6).

Based on World Health Organization (WHO) report, at least one million people in the world commit suicide annually (2). Suicide is the 8th cause of death in the United States of America, 2nd in 15-19 yrs old males residing in this country (7) and 10th in the world (1). Thus, suicide has been converted from an individual abnormality to an extensive important social obstacle. It is a social health problem which needs precise programming for its prevention (1, 8, 9).

Psychiatrists believe that suicide-related factors are different between men and women in different ages, various jobs, and different educational levels (10).

Furthermore, individuals commit suicide often as the result of psycho-somatic disorders. Among patients with psychological diseases who attempt suicide, some have depression and some are schizophrenic (which their hallucinations cause suicide attempt). Other psychological disorders are also responsible for suicide attempts to various degrees (11, 12). Some people attempt suicide because of their diseases (either psychotic or somatic); on the other hand, there are healthy ones with other types of problems. The latter group turned suicide into a big social problem (12).

Referring some patients with PIAS resulting from suicide attempts to our center, made some questions come to the physicians' minds as follows:

- 1- Is the possibility of PIAS higher in patients who attempt suicide?
- 2- Has airway care been insufficient in these patients while being under mechanical ventilation?

Presence of tracheal stenosis causes numerous difficulties for patients and their families and can also impose severe psycho-economical effects on family and society.

Since these patients formed a nearly harmonious group based on family and social aspects and related treatments, we studied them in a group as a descriptive study and compared them with a similar group of patients with PIAS to answer the

abovementioned questions.

MATERIALS AND METHODS

This was a prospective study including individuals who had been referred to our center between Apr 2003 and Jul 2004 because of PIAS due to suicide attempt. Information was entered in a questionnaire and regular follow-up was performed. The questionnaire contained various questions including psychological status, cause of suicide attempt, drug history, family history, economical state of patients' parents, marital status, the type of treatment and its results. The patients' follow-ups were done actively via face to face interview and by phone. Details are summarized in table 1. The results were compared with those of a similar group of patients with PIAS which was not due to suicide attempt.

RESULTS

The study patients were 10 females and 9 males with age range of 17-56 yrs; (25.3 ± 9.96 yrs). Only five of them were married (all of them were women). The educational level of these patients was as follows: one person was university student, 6 had high school diploma, and the remaining 12 had under diploma degree. Eight patients were unemployed. Based on psychologist's diagnosis, cause of suicide in 11 cases was psychosocial stress with an immature personality background, in 7 was psychological disorder and in one the cause was unknown.

Direct causes of suicide were family problems in 10 cases, lovesick in 2, addiction in 3, severe depression in 6, and social problems in 2 cases (in some patients there was more than one cause). None of them was the first offspring in their family and only five cases were under psychiatric treatment before attempting suicide.

Also, 5 patients had previous history of suicide attempt. The mean duration of intubation was 14.78 days (ranged 3-30 days). Eight patients had undergone tracheostomy procedure before being referred to us. Site of stenosis was the trachea in all patients and mean length of stenosis was 35.12 mm (20-59 mm).

Table 1. Information details of patients with suicide attempt

No.	Age/Sex	Suicide Device	Occupation	Educational Level	Marital Status	Offspring	History of Suicide	Cause of Psychological Disorder	Reason of Suicide from the patient's point of view	Duration of intubation (day)	Length of Stenosis (mm)	Treatment (D-or RA)	Result	History of psychological disorder	Description
1	F/20	Theophylline tablet	Student	5 th grade elementary	S	2 th	No	Psychosocial Stress	Family problems	13	30mm	RA	Recurrence, re-operation	-	Initially, RA was performed for her but recurrence occurred with no response to dilation, so RA was performed again and she got well. Initially, she underwent RA in another center but 4 days later, emergency tracheostomy was performed for her because of severe stenosis. Re-RT was performed in this center, and 8months later decamulation was performed and finally she got well.
2	F/25	Organophosphorus compound	Housewife	3 rd grade Guidance school	M	4 th	No	Psychosocial Stress	Family problems	17	10mm	RA	Re-operation (with no recurrence of our fault)	-	She had tracheal stenosis, underwent RA in this center and got well.
3	F/18	Sleeping pills + Indral	Unemployed	High school	S	2 th	No	Psychosocial Stress	Family problems	8	30mm	RA	Good	-	She had tracheal stenosis, underwent RA in this center and got well.
4	F/17	Rice Tablet	Unemployed	High school	S	3 th	No	Psychosocial Stress	Family problems	25	30mm	RA	Good	-	First, she underwent RA in another center but recurrence occurred. She had dyspnea in spite of frequent dilations but she did not accept more intervention.
5	F/32	Imipramine+ amitriptyline	Housewife	2 nd grade Guidance school	M	2 th	No	Psychiatric Disorder	Family problems	18	20mm	D	No recurrence	Depression	He had two sites of stenosis along with severe inflammation. Several dilations were done and then he underwent RA (for stenosis over tracheostomy site after resolving inflammation). Distal tracheostomy stenosis did not need another surgery/ surgical intervention.
6	M/20	Organophosphorus compound	Butcher	5 th grade elementary school	S	2 th	No	Psychosocial Stress	Love Sick+ Family problems	21	Complete obstruction over the tracheostomy site	RA	good	-	He got well after dilation
7	M/24	Opium	Unemployed	High school	S	3 th	2 nd time	Psychiatric Disorder	Addiction+ Love Sick	4	25mm	D	Good	-	He got well after dilation
8	M/33	Phenobarbital tablet	Unemployed	High school	S	2 th	7 th time	Psychiatric Disorder	Mental disorder/ neuropsychotic disease (depression +Love to die)	17	30mm	RA	Good	Depression	He got well after dilation
9	M/24	Opium+ clonazepam	Unemployed	3 rd grade elementary school	S	3 th	1 st time	Psychiatric Disorder	Addiction +no reason to live	4	38mm	RA	Good	-	He got well after dilation
10	M/17	Organophosphorus compound	Student	High school	S	6 th	No	Psychosocial Stress	Social problems+ bad behaviour of school managers	11	44mm	RA	good	-	He got well after dilation
11	M/26	Phenobarbital tablet	Medical student	5 th year of medical school	S	2 th	No	Psychiatric Disorder	Neuropsychotic disease (depression)	20	50mm	RA	Good	Depression	He got well after dilation
12	F/17	Oily poison	Unemployed	High school	S	2 th	No	Psychosocial Stress	Family problem (divorce+ Addiction)	5	45	RA	Dilation for her dyspnea	-	Ra was done for her but recurrence occurred which improved/ resolved by dilation
13	F/37	Phenobarbital tablet	Housewife	Guidance school	M	2 th	No	Psychosocial Stress	Family problem (addition+ unfaithfulness of her husband)	12	20mm	RA	RA	-	RA was done for her which followed by recurrence with no response to dilation and polyflex Stenting. She underwent re-RA and finally she got well
14	F/20	Indral	Unemployed	High school	S	3 th	No	Psychosocial Stress	Social (failing in entrance exam)	14	45mm	RA	RA	-	RA was done for her which followed by recurrence and then emergency tracheostomy and decamulation but her condition did not improve. Re-RA was performed and finally she got well
15	M/18	Organophosphorus compound	Student	guidance school	S	2 th	No	Unknown	Unknown (don't mention it)	3	38mm	D	-	-	His condition improved after dilation
16	M/22	Phenobarbital tablet	business man	High school	S	3 th	No	Psychiatric Disorder	Addiction + no reason to live	30	40mm	RA	RA	Depression	He had unstable psychotic status and underwent RA followed by recurrence with no response to dilation which controlled by replacing stent. He attempted suicide again and unfortunately, died.
17	M/37	Phenobarbital+ carbamazepine	Unemployed	5 th grade elementary school	S	4 th	1 st time	Psychiatric Disorder	History of convulsion+ death of his mother	29	30mm	RA	Good	Depression	His condition improved after dilation
18	F/18	Organophosphorus	Housewife	High School	M	3 th	No	Psychosocial Stress	Family problem	11	50mm	RA	Good	-	His condition improved after dilation
19	F/56	Organophosphorus	Housewife	Elementary/ Educational Courses for illiterates	M	7 th	No	Psychosocial Stress	Family problem	19	32mm	RA	RA	-	She underwent RA followed by recurrence which was controlled by replacing stent and she got well after its removal

RA: Resection Anastomosis
D: Dilation

The procedures were included laryngotracheal resection and reconstruction (resection anastomosis), bronchoscopic stenosis dilation and polyflex stenting. Three patients were treated with bronchoscopic dilation out of which one had undergone resection anastomosis in another center. In 16 cases, resection anastomosis was done (one patient had been operated in another center and was referred due to recurrence of post- surgical stenosis); consequently, 6 of them were involved with post-surgical stenosis recurrence (totally 8 patients).

Among these 8 patients, 4 underwent resection anastomosis again and 2 underwent stenosis dilation by rigid bronchoscopy. As a result, 6 of them were recovered. Stent was placed for the remaining 2 other cases. Only one patient had recurrent laryngeal nerve paralysis as a permanent complication. The statistical significance of various factors in our patients is shown in table 2.

Table 2. Statistical significance of different factors related to patients with attempting suicide.

Factor		p-value
Age	Ranging 17-35 yrs (mean ±SD), 25.3 ±9.96	_____
Sex	Female 52.6% Male 47.4%	p>0.05
Marital Status	Unmarried 73.7% Married 26.3%	P<0.05
Job	Unemployed 42.1%	
Educational level	Below diploma 63.1% Diploma and higher 36.9%	P>0.05
Suicide method	Pill 57.9% Poison 36.8% Opium 5.3%	P<0.05
Second offspring to next	second offspring to next 100% The first offspring 0	_____
Cause of suicide based on psychiatrist's diagnosis	Psychosocial stress 61.1% Psychiatric disorder 39.9%	P>0.05
Psychiatric disorder	Depression 71.4% Other disorders 28.6%	_____
History of suicide attempt	Negative 66.7% Positive 33.3%	_____

This group of patients (case group) was compared to similar group (control group) with PIAS which was not due to suicide attempt. Results are summarized in table 3. Of 55 patients in the control group, one had left vocal cord paralysis; one had right vocal cord paralysis, and one had fixed vocal cord. In addition, one patient died due to sudden cardiac arrest. In his history, he had heart failure and experienced several heart attacks before surgery.

Table 3. Comparison of patients group (who attempted suicide and involved with PIAS in Masih Daneshvari Hospital) with control group (who were intubated due to other causes and referred to this center simultaneously with the patients group).

	Control group	suicide group	p-value
Total	81	19	
gender			
Female	15	10	
Male	66	9	
Age range and mean (Yr)	17-66 24.42	17-56 25.32	
Subglottis stenosis	2	0	
Mean duration of intubation and range(day)	15.58 0-40	14.78 3-30	
Mean length of stenosis and range(mm)	28.28 10-60	32.72 20-50	P=0.011
Treatment			
resection-anastomosis	RA=55	RA=16	
bronchoscopy dilation	B-D=23	B-D=3	
Stent	S=2	S=0	
laser	L=1	L=0	
Post surgical recurrence in this center	5 55	6 16	P=0.011

DISCUSSION

1. **Age:** mean (±SD) age of these patients was 25.3 (±9.96) yrs. In fact, most of them were between 17 and 35 years old and only 3 patients were over 35 years. In a study conducted in Dubai, the age

range was 21-40 years (13). Another study showed that increasing the age results in increased suicide rate. Suicide rate seems to increase in men over 45 years old and women over 55 years of age (14). In contrast, we had only one female patient over 55 years old; additionally, suicide age range in men was under 37 years.

2. **Marital Status:** only five patients were married. The effect of marriage on decreasing the suicide rate in our patients was significant ($p < 0.05$). Suicide incidence in unmarried or single persons is twice the married ones (14). Thus, it seems that marriage and giving birth significantly reduce suicide incidence (11, 14, 15). In a survey conducted in the Lorestan province (Iran), 40 suicides were reported by eating chalk between 1995 and 2000. Most patients were single (52.17% single women and 88.2% single men) (16).
3. **Sex:** most patients in our study were men. In two surveys conducted in Oulu state in North Finland (17) during 1998-2000, and Dubai (13) during 1992-2000, the majority of patients attempting suicide were male. Suicide rate was also high in men in Highland of Scotland (18). It was also true in the USA (14). In contrast, of 40 patients who were studied in the Lorestan province, 57.5% were women and 42.5% were men (16).
4. **Occupation/ Employment:** our study patients were consisted of 5 housewives, one medical student, one butcher, 3 students, one businessman and the others were unemployed. Unemployment rate did not show statistical significance as a suicidal cause. However, 42.1% of patients were unemployed. Numerous studies have shown employment as a protective factor against suicide (12, 14). In other words, there was a strong relationship between unemployment and suicide (11, 19, 20, 21, 22, 23, 24). In our study, most patients were unemployed. In a study performed on 40 patients in the province of Lorestan (16),

37.5% were students, 35% were housewives and 10% were unemployed. In the present study, these percentages were 15.8%, 26.3% and 42.1%, respectively.

5. **Suicide methods:** several methods have been reported for suicide, however, selecting these methods depends on cultural, geographical and socio-economical conditions. Among our study patients, pills, poison and opium had been used in 11, 7 and 1 cases, respectively. Drug consumption showed statistical significance ($p < 0.05$). Some of these drugs were indral, phenobarbital and benzodiazepines. Hanging was the most common method of suicide in Dubai (13) and the USA (14). A survey performed in South-West of France (Aquitaine), showed hanging, drowning, and drug use as the most common methods of suicide (25). Hanging is one of the most common methods of suicide in the world (26). In a survey conducted in South Africa, hanging, use of firearms and self-poisoning consisted 57%, 30% and 13% of suicide attempts respectively (27). Suicide attempt by eating chalk is a strange method which has been reported only in Lorestan, Iran (16).
6. **Reason of suicide attempt:** one of the important risk factors in Denmark study (1981-1997) was psychological disorder or history of hospitalization due to that (21). Other studies have considered mood disorder as one of the risk factors for suicide attempt (11). Epidemiological studies in Lorestan province showed a higher frequency of psychological disorders in subjects in the age range of 26-40 years compared with those in the age range of 18-25 yrs. Some factors such as environmental stress, repeated child births, anxiety due to biologic alterations in women, occupational and economical problems, unemployment in men, divorce and high education cause high frequency of psychiatric disorders in these ages (28). However, in our

study only in 7 patients the suicide attempt was as the result of recognized psychiatric disorder and psychosocial tensions were the cause of suicide in the others. Psychological disorders in these 7 cases were mostly seen in the age group of 26-37 years compared with those less than 25 yrs; 57.14% were unemployed and 85.71% were male. It seems that attention must be paid to decrease these stresses in young adults. 39.9% of our study patients who went to coma due to suicide attempt had psychiatric disorder of which 71.4% had depression based on psychiatrist's diagnosis.

7. **Cause of stenosis:** the most important cause of PIAS is long duration of intubation and poor nursing care of airways during this period (29). This length of time in our patients was not different from other reports but we assume that the patient's care has not been appropriate. A hospitalized patient with suicide attempt may be ignored by his or her family and physician, or perhaps another cause might be responsible in this issue. One of the important differences between our study and other ones is using pills, especially diazepam and phenobarbital, for suicide by our patients. We suppose that maybe these drugs or those used to control symptoms like convulsion are responsible for stenosis. All study patients had used drugs or poisons for suicide attempts. Perhaps using these drugs or application of some methods for detoxification is responsible for causing scar and endotracheal fibrosis; however, evaluation of this hypothesis is difficult. Anti-convulsant drugs, particularly dilantin, were prescribed for our patients. It is believed that dilantin aggravates scar formation. This capability has been used for healing of bed sores (30-33). However, the effectiveness of these drugs is not known in our patients. Although the majority of study patients had been hospitalized in academic medical centers and emergency wards, this rate of PIAS seems unusual; however, precise statistical

judgement is not possible.

We assume that admission overload of these patients can decrease the caring level and impose an unbearable pressure on hospital personnel. It is suggested that those patients with acute respiratory failure due to drug poisoning should be transferred to centers with special facilities and capability of ventilation support one or two days after the admission.

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