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Suicidal Cut Throat Injuries: Management Modalities

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1. Introduction

Suicide is defined as the act of taking one's life. This self destructive act constitutes an individual intentionally or ambivalently taking his or her own life.

Suicidal behavior is any deliberate action with potentially life-threatening consequences, such as taking a drug overdose or deliberately crashing a car.

Oftentimes suicide is committed by individuals suffering from a mental illness; therefore, it can be used as an index of mental ill health in a community.

Several forms of suicidal behavior exists which fall within the self destructive spectrum. These include;

Suicide attempt: This involves a serious act, such as inflicting self injury and some other person accidentally intervening. Without the accidental discovery, death of the individual would occur.

Suicide gesture: This is when an individual undertakes an unusual but not fatal behavior as a cry for help or to get attention.

Suicide gamble: This is inflicting self injury knowing that family members or other persons will be home in time to discover and save them.

Suicide equivalent: In this situation an individual does not attempt suicide. Instead, he or she uses behavior to get some of the reactions their suicide would have caused. For example, an adolescent boy runs away from home. He wants to see how his parents respond to his absence from home. He wants to know if they care, if they are sorry for the way that they have been treating him. This can be seen as an indirect cry for help.

There are various ways of executing suicide ranging from ingestion of fatal drug dosages to slitting one's wrists, hanging by the neck to cutting of the throat. Cut throat injuries may be homicidal or suicidal and they are potentially life threatening injuries because of the many vital structures in the neck which may be affected leading to sever hemorrhage, air embolism or respiratory obstruction and death. Therefore, prompt and adequate intervention is required following a cut throat injury from an attempted suicide to save a patient. This chapter aims to discuss the management modalities available for cut throat injuries with suicide as the motivating factor.

2. Epidemiology

Suicide is one of the ten leading causes of death in the world with about one million deaths recorded annually¹. The incidence and pattern of suicide varies from one geographical location to the other because religious, cultural and social values play an important role in its occurrence.

In the United States it is the eleventh leading cause of death². An alarming estimated 700,000 people worldwide attempt suicide annually³.

Overall, 2.9 percent of the adult population attempts suicide and the suicide rate in the general population over a lifetime period of 70 years is about 1 percent^{4,5}. Studies of suicide attempters suggest that one percent to two percent complete suicide within a year after the initial attempt, with another one percent committing suicide in each following year⁶.

Suicides in Ife, western Nigeria were found to be 0.4 per 100,000 population in 2001 with a higher incidence in males with a male to female ratio of 3.6 to 1. The majority of the victims were in the third decade of life⁷.

Men commit suicide far more frequently than women. In a study in the United States in 2004, the suicide rate for men was 18.0 per 100,000 population and 4.5 per 100,000 populations for women⁸. However, women make far more suicidal attempts than men.

The rate increases with age with a major peak in adolescents and young infants. Interestingly however, geriatric suicide is becoming prevalent with individuals older than 65 years having the highest rate of suicide².

Suicides occurring from cut throat injuries are rarely reported in the medical literature but they do occur. They may occur either in isolation or as part of multiple injuries in a poly-traumatized patient.

3. Risk factors

The risk factors for suicide are classified as proximal or distal and within these broad groups as either;

1. Mental illness
2. Socio-demographic
3. Familial
4. Biological
5. Situational (life experiences) risk factors.

Mental illnesses are the strongest predictors of suicide¹. Suicide occurs 20.4 times more frequently in individuals with major depression than the general population⁹. Older people who are depressed are also more at risk of committing suicide than younger depressed individuals⁴.

The prevalence of major depressive disorder in western industrialized nations is 2.3 percent to 3.2 percent for men and 4.5 percent to 9.3 percent for women. The lifetime risk of depression ranges from 7 to 12 percent for men and 20 percent to 25 percent for women. Studies indicate that the risk of depression is not related to race, education, or income⁵.

In a 5 year study in New Zealand, of 302 individuals making medically serious suicide attempts, 67 percent died by suicide and 37 percent made at least one fatal attempt. Hence, there is a need for enhanced follow-up, treatment and surveillance of any individual making suicide attempts¹⁰.

Other mental illnesses linked with suicide are schizophrenia, anxiety disorders, post-traumatic stress disorder, delirium, dementia and substance abuse.

A positive family history is also regarded as a predictive factor therefore careful assessment of family history of mental illnesses and suicide should also be a routine aspect of patient evaluation.

Unemployment can act as a stressor leading to suicide¹¹ with studies suggesting an increase in the parasuicide and suicide rates among unemployed individuals than in the general population¹². This is more so for the male who is the breadwinner of the family in many societies. He can get frustrated when not able to meet family needs and want to take his own life¹³. It is a known fact that the suicide rate among non-waged workers is significantly higher than that of waged workers¹⁴.

Socio-demographic factors linked to suicide are sex, type of occupation, alcohol consumption and the availability of a weapon such as a rope, knife or gun. Others are religion, ethnicity, and even seasons. The regions of the world with long, dark winter seasons such as Scandinavia and parts of Alaska like Nome are known to have higher suicide rates.

Some life events are also linked with the act of committing suicide for example a child who witnesses a family member committing suicide may later make similar attempts and kill himself or herself.

Scientists believe that the interplay of several factors which lead to depression is very complex. Family studies have shown that 20 to 50 percent of children and adolescents who experience depression have a positive family history of depression^{15, 16, 17, 18} and children of depressed parents are three times more likely to experience a depressive disorder¹⁹. They are also more vulnerable to other mental and somatic disorders²⁰. It is however not clear if depressed parents create an environment that increases the chances of a mental disorder developing in their children. Like other mental illnesses, depression is probably caused by a combination of biological, environmental and social factors as mentioned above. The exact causes are however not yet known. Scientists have thought for a long time that low brain levels of neurotransmitters like serotonin, dopamine and norepinephrine was responsible for depression.

There can be underlying physical reasons for severe depression in certain individuals. For example, individuals diagnosed with a terminal illness, or those living with a long term physical disability, especially if accompanied by pain that is never likely to go away. It can be much harder to treat depression for individuals in this category, as the underlying causes are physical issues that cannot be cured. That is not to say though that even individuals such as this cannot find a motivating reason for living. Table 1 below shows some medical conditions associated with an increased risk of suicide. Suicide attempters are noted to have higher rates of comorbid mental illnesses and individuals who have attempted suicide in the past also have an increased chance of future suicidal behavior.

The incidence and pattern of suicide varies from country to country. Hanging, poisoning and drowning are the commonest methods of committing suicide in some regions of the world. Other not so common methods of committing suicide documented in the literature include;

1. Suffocation.
2. Electrocutation.
3. Jumping from a height.
4. Vehicular impact.
5. Immolation.
6. Hypothermia.

7. Starvation (apocarteresis).
8. Dehydration.
9. Firearms.
10. 'belly slitting' a rather interesting method also referred to as *Seppuku*.

Cancer	Chronic pain	Hypertension
HIV/AIDS	Chronic renal failure	Epilepsy
Multiple sclerosis	Spinal cord injuries	Peptic ulcer disease
Cardiopulmonary disease	Huntington's chorea	Rheumatoid arthritis
Organic brain syndromes	Head injury	Cushing's syndrome

Table 1. Medical conditions associated with increased risk of suicide

Suicide by means of cut throat is either rare as reported by some or common as reported by other researchers. The paucity of reports from some parts of the world like Nigeria may be because these injuries are rare or underreported¹³. Throat-cutting is not indigenous to Nigeria or any other country for that matter. The mode of committing or attempting suicide depends on the type of weapon available to the individual. From various reports in Nigeria, the commonest method of committing suicide seems to be the ingestion of poisonous materials followed by the use of weapons like the knife and the Dane gun^{7, 21, 22}.

The scope of this chapter does not include discussions on the other methods of suicide mentioned above but it is important to note them.

4. Management

Suicide is preventable therefore in many cases swift decisive intervention can prevent an individual from committing it. Intervention is based on the application of risk factors with adequate clinical inquiry.

When suicidal cut throat injuries occur, a multidisciplinary approach is required in the effective management of victims. This requires the close collaboration of the Otorhinolaryngologist, the anesthesiologist and the psychiatrist²³.

The diagnosis is based on anamnestic data, clinical check-up and inspection of the pharynx, larynx, esophagus and contiguous structures to determine the extent of injury.

The neck contains vital structures- neurovascular bundles, larynx, trachea, esophagus and spinal cord etc in a small compartment, therefore these injuries are life threatening and present as emergencies. The injuries are varied and depend on the pattern, site and depth of the cut on the neck.

The severity of the injury is assessed by assigning the injury to areas or zones of the neck. This way, the vital structures affected in the course of injury can be determined. Injuries of the neck are divided into three anatomic zones for the purpose of ease of assessment;

1. Zone I injuries occur at the thoracic inlet. This zone extends from the level of the cricoid cartilage to the clavicles.

2. Zone II injuries are those occurring in the region between the cricoid cartilage and the angle of the mandible. Injuries in this zone are the easiest to expose and evaluate.
3. Zone III injuries occur between the angle of the mandible and the base of the skull. Unlike zone II, zones I and III are protected by bony structures making zone II more vulnerable to injuries.

Assessment of these patients begins with the ABCs of resuscitation i.e checking the airway, evaluating the patient's breathing and circulation. Resuscitation of individuals is commenced immediately. When the victims present;

1. The anesthesiologist secures an uncompromised airway and makes sure the patient is breathing.
2. The otorhinolaryngologist assesses the injury and surgically repairs the severed tissues with the aim of restoration of breathing, swallowing and phonation.
3. The psychiatrist provides adequate care and supervision during and after surgical repair of severed tissues.

If the victims present without airway compromise, an assessment of the severed tissues is made and meticulous surgical repair effected in the shortest possible time.

Securing the airway is the first priority in the management of these patients if the airway is unstable or in the presence of edema. The ideal way to establish airway is orotracheal intubation in the awake patient which is followed by the insertion of a tracheostomy tube through the transected portion of the trachea if a transection is present. Some authors have described this approach to be dangerous because it can produce a further damage to the larynx or increasing the chances of inhaling vomitus, blood or secretions ²⁴. However, a formal tracheostomy can be done in the early phases of presentation to secure the airway and anesthetic gases can be administered via this in order to carry out repair under general anesthesia. Although, in severe airway compromise reports have been made of airway maintenance with endotracheal intubation alone and there have been reports of the effective use of a fiberoptic laryngoscope to intubate the trachea following a cut throat injury ²⁵. This has reduced the need for tracheostomy and its attendant complications. In the event that the trachea is completely transected, a re-anastomosis of the transected ends of the trachea is done. Most practitioners advocate the use of absorbable suture in achieving this. One or two stainless steel wires can be used in addition to the absorbable sutures to provide strength to the anastomosed tracheal ends. Bryce demonstrates this in his work and to relieve the tension on the anastomosis, he keeps the patient's neck flexed postoperatively for seven to ten days by suturing the chin to the sternum ²⁶. Sometimes, a segment of the trachea may be badly damaged requiring resection. It is generally agreed that the maximal length of trachea resectable is 7cm and the cut ends of the trachea would require mobilization in the neck in order to achieve anastomosis by a laryngeal release procedure or in addition by splitting the sternum and mobilizing the main stem bronchi ²⁷. The combination of these three procedures can achieve a mobilization of the trachea for a distance of 7cm. In achieving mobilization of the cervical trachea, the surgeon needs to bear in mind the fact that the blood supply of the trachea is placed laterally from the inferior thyroid artery and the right bronchial artery. Therefore, mobilization should be only in an antero-posterior plane leaving the lateral fibrous attachment untouched.

Once the airway is secured, the treatment option is timely surgical repair of the severed tissues in order to restore structure and functions. These injuries will involve the soft tissues, neurovascular bundles, cartilage and bones all or in part depending on the magnitude of

impact of the cutting agent used. The extent of repair is therefore determined by the extent of injury.

Blood tests (urgent packed cell volume, urea and electrolyte levels), angiography, endoscopy (esophagoscopy, microlaryngoscopy and bronchoscopy) and computerized tomographic (CT) scan helps to determine the extent of injury. Individuals are transfused with whole blood depending on the extent of blood loss. Plain radiography alone is not sufficient to diagnose airway trauma and the additional use of dynamic CT scan of the trachea and larynx and magnetic resonance imaging (MRI) can be very helpful in discovering previously undetected injuries, showing that some of these injuries may not even require surgical intervention. However, adequate airway management should not be delayed by radiologic studies because an apparently stable airway can rapidly progress into an acute airway obstruction^{28, 29}.

In some environment, late presentation is a common feature due to factors like ignorance and of course poverty which may also invariably be the triggering factor for the suicidal attempt. In the event of late presentation, debridement of infected tissues is also done prior to suturing (Figure 1). Debridement may also mean loss of substantial amounts of tissue to effect simple and proper closure. Ideally, pharyngeal, hypopharyngeal and laryngeal mucosal lacerations should be repaired early because the time elapsed before repair of laryngeal mucosal lacerations has an effect on both airway stenosis and on voice restoration³⁰. Soft laryngeal stent may be needed for severely macerated mucosa.



Fig. 1. Infected suicidal cut throat injury at presentation.

A pharyngo-cutaneous fistula must be prevented as much as possible while carrying out pharyngo-hypopharyngeal repair. This requires meticulous approximation of the tissues,

use of a nasogastric (NG) tube and avoidance of oral feeding for a period of 7 -10 days. If a pharyngo- cutaneous fistula occurs, NG tube feeding must continue until the fistula closes. If the fistula persists for more than 6 weeks, it may indicate either the presence of a foreign body, wrong surgical technique, malnutrition or a concomitant underlying malignancy especially in the elderly. Such extreme cases may need flap closure using local, regional or distant flaps after excision of the fistula. To avoid the discomfort of inserting an NG tube, the risks of aspiration and the effect of an impinging foreign body at the injury site, Darlong et al have advocated the creation of a feeding jejunostomy which is used to maintain enteral feeding³¹. This involves passing a catheter through the anterior abdominal wall into the jejunal lumen via an intramural tunnel. The catheter is advanced distally to prevent reflux and it is then secured using purse-string suture. Any excess catheter length is removed from the peritoneal cavity until the jejunum lies adjacent to the parietal peritoneum. Interrupted stitches are then used to secure the jejunum in place.

Complications may follow a feeding jejunostomy and should be noted and addressed appropriately. These complications are;

1. Nausea.
2. Diarrhea.
3. Constipation.
4. Abdominal distention.
5. Abdominal cramps.
6. Reflux.
7. Catheter blockage.
8. Pericatheter leakage.
9. Catheter dislodgement.
10. Jejunal perforation.

Tissue injury may be as extensive such as severe laryngeal injuries as to warrant a total laryngectomy.

Careful handling and suturing of the severed tissues usually gives a reasonably good outcome with the restoration of breathing, swallowing and phonation (Figure 2).

Individuals are then weaned off their endotracheal tubes, tracheostomy or NG tubes before discharge.

Mental health intervention is one of the most important parts of managing suicidal cut throat attempts. After suicidal behavior is addressed, any underlying disorders should be treated. Mental disorders like depression, schizophrenia, substance abuse, alcohol dependence should be sought from proper clinical assessment of individuals and treated.

Even following discharge from otorhinolaryngological care, individuals should be closely followed and supervised in order to prevent another suicidal attempt that may actually lead to the death of these individuals. Those who try to commit suicide should be assessed and treated to reduce the risk of future attempts. All suicide attempts and expressions of suicidal intent should be taken seriously regardless of whether the individual has made multiple past attempts of low lethality, regardless of the presence of a suspected personality disorder and even if it has been suggested that the attempt was with the aim to manipulate other people. Sometimes a patient's suicidal gesture will be described as 'attention-seeking'. This term is often used in a derogatory term and is best to avoid this as it is likely to negatively influence an otherwise objective risk assessment.



Fig. 2. Repaired cut throat injury.

Some authors are of the opinion that self-harm attempts can be grouped into 'serious suicide attempts' and more impulsive forms of deliberate self-harm. The former is typically associated with severe mental illness, high intended lethality and attempts by the suicide attempter to avoid rescue. The latter is considered a manifestation of personality disorder or acute crisis, where there are impulsive, poorly planned attempts at self harm. This rule of thumb may be misleading, regardless of the potential for death or serious injury in the deliberate self harm category, the rates of completed suicide years after a seemingly minor episode of so called 'deliberate self harm' are significant. This fact is highlighted in a study done in Australia in which 223 patients were followed from 1975 onwards. Of those who had made an attempt at deliberate self harm in the mid 1970's, 4% had completed suicide at 4 years, 4.5% at ten years and 6-7% by 18 years.

The following are important in the assessment of suicide attempters;

1. Building a rapport- These patients may be depressed, embarrassed or guarded; therefore they may be reluctant in volunteering a history. They are relieved and corporative by the unburdening of their troubles rather than being annoyed and offended at them.
2. Taking a psychiatric history- Information regarding the attempt or intent of suicide should be obtained in an open and direct manner without any form of ambiguity. It is helpful to introduce questions regarding the suicide in a sequential manner. It is often

useful to run through the chronological events leading up to, during and after the suicide attempt to assess the level of risk.

Risk assessment is the process of estimating the degree of dangerousness to self and to others and it should be known that the strongest predictor of future dangerousness is past dangerousness³². There are two approaches to risk assessment;

- The actuarial assessment.
- The standardized clinical assessment.

The actuarial approach to risk assessment is inferior to a standardized clinical assessment³³ because it provides little more than passive prediction³⁴. The apparent superiority of clinical judgment appears to relate to its emphasis upon prevention, rather than prediction. The approach to the acute assessment of dangerousness requires consideration of both "static" and "dynamic" risk factors. Static risk factors are the components of a particular patient's presentation, which are not amenable to intervention, such as age, gender or aspects of a patient's previous history, such as a past history of violent offending. By contrast, dynamic risk factors are those which are potentially changeable to clinical intervention, such as active psychotic symptoms, problematic living circumstances or substance abuse. The value of such an approach is that certain factors amenable to clinical intervention can be identified and implemented, thus potentially reducing risk.

Other factors to consider when taking a psychiatric history are;

- a. Events prior to suicide attempt: ask about the following;
 - exposure to significant acute psychosocial stressors or medical problems which may be the precipitating or motivating factors.
 - presence of low mood or symptoms of major illness.
 - feelings of hopelessness.
 - substance abuse.
 - conscious efforts at a preparation for death e.g. finalization of will.
 - onset of suicidal ideation.
 - degree of planning versus impulsivity.
 - the patients perception of the degree of harm to be inflicted on self by the chosen method of suicide.
- b. Events at the time of the act of suicide: ask about;
 - the setting at the time of suicide attempt.
 - the presence of stressors.
- c. Events following the suicidal attempt:
 - is the patient sad or glad that he is alive following suicide attempt?
 - any exhibition of remorse about the attempt?
 - did the patient call for help after the attempt?
 - is the patient still in possession of the object used in the attempted suicide?
 - is the patient willing to accept treatment?
 - presence of ongoing intents.
 - patients ongoing plans for the future.
 - availability of support in the community for the patient.
 - has the attempt at suicide helped the patient in the release of his/her frustrations?
- d. Past psychiatric history:

- previous suicide attempts and all the events that occurred at the time.
 - presence or absence of a diagnosed mental illness or personality disorders.
- e. Collateral history:

This is obtained from the past medical files, family members and friends. In this case issues of privacy and confidentiality must be weighed against the level of risk.

5. Medical and physical assessment

Thorough physical assessment of the patient is done by the medical staff. Assessment of the patient's cognitive functions may be important here. Sedatives may be given to reduce the patient's distress or risk of harmful behavior.

It is important that the patient is medically stable before being transferred to the psychiatric ward.

The aim of psychiatric management is to treat the condition that may have led to suicide attempt. Irrespective of the condition acting as trigger for suicide, psychosocial interventions play an important role in the management of these patients. Table 2 below shows some pharmacological agents used in the treatment of these conditions.

Risk factors	Pharmacological agents
Schizophrenia	Clozapine
Bipolar disorder	Sodium valproate, Carbamazepine, Lamotrigine, Gabapetin, Lithium, (these are used as mood stabilizers)
Psychosis	Haloperidol, Risperidone, Flupenthixol
Major depression	Tricyclic antidepressants (TCAs), Selective serotonin reuptake inhibitors (SSRIs)

Table 2. Pharmacological agents used in the treatment of conditions associated with suicide.

6. Management of complications

Surgical repair can be complicated by the long term morbidity of laryngo-tracheal stenosis and pharyngocutaneous fistula ^{35, 36}. These follow grossly damaged and infected laryngotracheal structures in a cut throat injury especially when poorly managed ab initio. Proper initial management and early repair of the cut throat injury will prevent the development of these complications. Two methods of treatment can be employed for laryngotracheal stenosis- endoscopic and open surgery. Open surgery is the treatment of choice because in the long term it provides a better success rate and functional results.

However, if a contraindication exists to an external approach, laser assisted endoscopy with stenting can also provide good palliative results ³⁷.

7. Prevention

Suicide attempts and threats should always be taken seriously. About one-third of people who attempt suicide will repeat the attempt within 1 year, and about 10% of those who threaten or attempt suicide eventually do kill themselves.

Individuals who are suicidal have a number of characteristics, including the following:

- A preoccupation with death or even stating the desire to harm themselves.
- A sense of isolation and withdrawal from friends and family.
- Anhedonia: distraction and lacking the sense of humor.
- Performing self-destructive behaviors, such as drinking alcohol or substance abuse.
- Focusing on the past: dwelling in past losses and defeats and anticipate no future. They voice the notion that others and the world would be better off without them.
- They are haunted and dominated by hopelessness and helplessness.

When an individual is noted with these symptoms mental health care should be sought immediately. Dismissing the person's behavior as attention-seeking can have devastating consequences.

It is important to note that not all individuals who are exposed to risk factors develop suicidal behaviors. It therefore means that there are certain protective factors that act to mitigate the effects of exposure of individuals to risk factors. These protective factors act to counter the adverse effects or moderate the impact of risk factors and they are classed as follows;

1. Individual attributes: These include

- a. Cognitive abilities such as Intelligence Quotient (IQ) scores and executive functioning skills.
- b. Temperament control.
- c. Personality e.g. adaptability.
- d. Self regulation skills such as the control of impulsive behavior.
- e. Self perceptions of competence/Self esteem.
- f. A positive outlook on life.

2. Relationships:

- a. Relationships with competent adults e.g. parents, mentors and other family members.
- b. Interaction with members of a social peer group.

3. Community resources and societal opportunities:

- a. Good and proper schools.
- b. Connections with social and societal organizations such as religious groups.
- c. A good and qualitative neighborhood.
- d. Proper health care and social amenities.

8. Summary/Conclusion

Suicide is preventable and identifying the risk factors with rapid and decisive interventions can save lives.

Even as screening and the treatment of mental disorders is important, ways must also be found to identify the many people without mental disorders who are at risk of suicidal behaviors.

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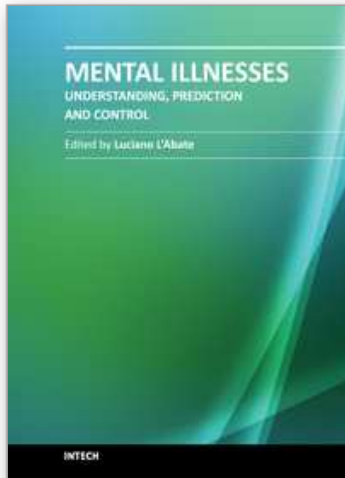
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In the book "Mental Illnesses - Understanding, Prediction and Control" attention is devoted to the many background factors that are present in understanding public attitudes, immigration, stigma, and competencies surrounding mental illness. Various etiological and pathogenic factors, starting with adhesion molecules at one level and ending with abuse and maltreatment in childhood and youth at another level that are related to mental illness, include personality disorders that sit between mental health and illness. If we really understand the nature of mental illness then we should be able to not only predict but perhaps even to control it irrespective of the type of mental illness in question but also the degree of severity of the illness in order to allow us to predict their long-term outcome and begin to reduce its influence and costs to society. How can we integrate theory, research evidence, and specific ways to deal with mental illness? An attempt will be made in the last conclusive chapter of this volume.

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