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EDITORIAL

THE INCLUSION OF MATHEMATICS TO THE SRI LANKAN MEDICAL CURRICULUM

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Numeracy and literacy are considered two of the most important skills for medical practitioners. Even though the Sri Lankan medical curricular provide opportunities for students to improve their literacy skills through short courses conducted by the faculties, there seems to be no move towards improving their numeracy skills.

Researchers hypothesize that some medical students experience 'numerophobia' - a perceived and disproportionate fear of numbers and simple mathematical manipulation.[1] In the Sri Lankan context this maybe compounded by the fact that mathematics is not a requirement to follow the medical program.

Mathematics is possibly the ideal training for any career in science, medicine, law, or business and would contribute to a well-rounded education.[2] Universities world-wide which consider mathematics as a prerequisite for the medical course justify its requirement in many ways. Even though some consider it a "weeding tool", to select those students who have high cognitive ability, some universities make following a course in mathematics compulsory after selection to the medical course in order to develop their reasoning and analytical skills.[3]

Inclusion of mathematics into the Sri Lankan medical curriculum could be justified not only by the fact that a mathematics knowledge is needed to; calculate drug doses, concentrations, calculate acid–base status and understand the core statistical concepts most commonly represented in the medical literature[4] but by also considering the fact that a mathematics training for medical students would teach rigorous thought and logical reasoning that are needed for clinical reasoning,[5] facilitate problem solving, probabilistic reasoning and creativity and provide the ability and confidence to conduct high quality research, review of articles and encourage the practice of evidence-based medicine.

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POINT OF VIEW

THE NEED TO ABOLISH THE DEATH PENALTY

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The death penalty or Capital punishment or judicial hanging or sending to the "Gallows" is the killing of a person by legal statute. In this situation the head of state is literally the executioner as he gives the final order for execution, including the date, time and the place of execution. Thus the state legalizes, solemnizes and sanctifies the act of termination of a human life.

In Sri Lanka offences for which the death penalty is applicable include.[1]

(a) Murder and conspiracy to murder
(b) Abetment of suicide when such person commits suicide.
(c) Possession of 2 or more grams of Heroin.

Several other offenses for which the death penalty is applicable in other countries are not applicable in Sri Lanka.

Hanging by the neck is the only mechanism used to cause death in the judicial setting in Sri Lanka as proclaimed by the British after they took control of the island in 1815.[2]

The death penalty which may be implemented by "hanging" or any other means amply describes and explains the cruelty of the death sentence. Amnesty international in 1990 described the death penalty as "cruel, inhuman and degrading".[3,4] There is mental torture for the person sentenced to death for several days, weeks or months before the date of execution. Further there is physical torture during execution. What about the mental torture afflicted on the next of kin, mainly the innocent wife, children, parents, many of who become destitute. Does the state who took the life of the prisoner take care of the dependents?

As a judicial medical officer working in the Ministry of Health for 32 years, I have given evidence in several hundreds' of murder trials where the accused may very well have been sentenced to death. However, I am much relieved that such death sentences have not been executed.

Most prosecuting counsel believe that society demands accountability from the state for such terrible crimes and that the murderer when convicted forfeit the right to live in that society. They also believe that the death penalty is the only mechanism to protect innocent human lives from murderers.

Does the prosecution and civil society organizations who clamour for the implementation of the death penalty ever reflect that the murderer is another human being, living in the same society, misguided by that society which nurtured the prosecution and those who demand implementation of the death penalty.

If the prosecuting counsel and convicting judges and civil society organizations ever visit the "Gallows", to witness an execution and see the pathetic state of a man dead (or at times struggling) I am confident that they will never ever sentence to death a man by hanging but will certainly opt for life imprisonment.

The death penalty as a deterent to murder has no support, as research carried by states where the death penalty is used as a punishment for murder indicates the negative. Such research carried out mainly in the U.S.A where the death penalty is implemented by several methods indicate a much higher murder rate which is further proof that the death penalty is not a deterent to murder.[5]

The British Commission on capital punishment noted that the capital punishment obviously failed as a determent for grave crimes such as murder.[6]

Another argument in favour of the implementation of the death penalty is based on retribution. Here the concept is that evil can be countered by appropriate punishment. But this is not retribution but simply revenge of a highest order like the Bibilical saying "Eye for an Eye or a tooth for a tooth". In the context of the death penalty it simply means life for a life. Such revenge and retaliation for murder cannot be accepted in modern civilized society.

Legal argument for abolition of the death penalty includes:

(a) Most murders are not premeditated and there was no criminal intent.
(b) Erroneous convictions. In other words innocent person have paid with their lives for murders committed by others. Most erroneous convictions are due to mistaken identify and false evidence, where the actual murderer becomes a crown witness and the chief witness for the prosecution.

Even if a single prisoner is executed by an erroneous conviction, that itself is a valid reason for the abolition of the death penalty. Studies in USA have revealed that the likely number of executions by erroneous judgments are about 4%.[7] It is often stated in legal parlance that it is better to send home 99 murderers than to convict and execute one single innocent man on a charge of murder. How many such innocent persons have been executed to date? Several persons convicted of murder and sentenced to death have been exonerated later on DNA evidence. In Sri Lanka how many murder convicts can have access to DNA technology when they are wrongfully found guilty of murder and sentenced to death? DNA studies have exposed the fallibility of the criminal justice system.[8]

In Sri Lanka inherent legal defects leading to wrongful convictions for murder include:

(a) Wrongful indictment for murder.
(b) Murder suspect not "adequately" represented by counsel.
(c) Non-representation of accused by lawyers in certain types of murder cases.
(d) Failure of defense counsels and judges to seek second opinions in respect of medical and scientific evidence which is dubious.
(e) Failure to obtain a report from a psychiatrist as to the mental state of the

accused at the time of committing the murder.

(f) Judicial errors – all judges are human and are fallible.

(g) Perverted jury verdicts – a divided jury verdict of 5 to 2 where there is a reasonable doubt the verdict is sufficient to sentence a person to death on a murder charge.

Every human being has a right to life, both the victim and the murderer. The death penalty is clearly in violation of the right to life and right to live. The Universal declaration of Human Rights in 1948, proclaimed that "every individual has a right to life, liberty and security of his person.[9] Amnesty International in 1977 and other civil organizations called for the abolition of the death penalty.

Sri Lanka did not abolish the death penalty but retained the death penalty in its legal statutes. However Sri Lanka did not carry out the death penalty as a government policy since 1956. The re-implementation of the death sentence in 1961 to punish the three murderers of the then Prime Minister resulted in 89 person being executed by hanging. Subsequently, it was once again not carried out since 1976. Today there are nearly 1000 prisoners on death row in Sri Lanka, awaiting execution. All of them are at the mercy of the executive who decides on the life and death of such convicts. The Morris Commission of Ceylon established in 1958 strongly argued for the abolition of the death penalty as it was totally against the Buddhist tradition of tolerance and compassion.

If the death penalty is to be abolished, there must be an alternative to it. British Governor Sir Joseph West Ridgway commuting the death sentence to life imprisonment stated "it compels me to remit the extreme death penalty which would close the door for further inquiring and reparation should the doubt be confirmed by future revelation.

In the Roman Treaty of 1998, the international Criminal Court stated that the maximum penalty should be life imprisonment even for the worst crimes against humanity such as gruesome murders, genocide, rape and murder and torture and murder.

Life imprisonment in Sri Lanka means imprisonment for 20 years with hard labour. However, they can be released by the executive after 20 years or before 20 years. This punishment is not a deterent to murder. The alternative punishment is *imprisonment for life* where the convicted prisoner spend the rest of his life in a prison environment without parole. Such convicts can undergo counselling, psychiatric treatment if necessary, be given a suitable education, placed in a religious background of their choice, receive vocational training and thereafter be rehabilitated in an open prison environment. This would be beneficial to the convict, his family and to the country. The 1962 survey in the United Nations also showed that "imprisonment for life" for convicted murderers is sufficient protection for society. Furthermore, those who are convicted but later exonerated may be awarded compensation.

The declaration of the World Medical Association (WMA) in 1977 at Stockholm stated: that the death penalty is the ultimate, cruel, inhuman and degrading punishment for a human being as it violates the right to life and that it is totally and unconditionally opposed to the death penalty and calls upon all governments to bring about the immediate and total abolition of the death penalty.[10]

Implementation of the death penalty is a journey of no return to an innocent man. Universal abolition of the death penalty will be one of the most beautiful victories of humanity.[11]

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DEATH OF A MAN MANAGED FOR BACKACHE FOLLOWING A FALL FROM A HEIGHT

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ABSTRACT

This case illustrates a death of a man who had fallen from a height and managed for fracture of spine who had ultimately died of an unexpected, under-attended pathology.

A 35-year-old previously healthy man had a fall from a height and was admitted to a surgical ward with backache. He was diagnosed to have a fracture of the 12th thoracic and 1st lumbar vertebrae. On the 14th day after the fall he became confused but was not febrile. Condition worsened and he succumbed on the 15th day. Examination of the x-ray spine revealed the "fracture" of the 12th thoracic vertebra.

At autopsy a defect in the spine was detected with no associated hemorrhage. There was subcutaneous and muscle contusions of the right sacral area with no associated bony injuries. The kidneys were enlarged, congested, oedematous with multiple abscesses indicating acute pyelonephritis.

It may be concluded that other possibilities of back ache unrelated to trauma need to be considered in persons who fall from heights.

Key words:
Fall, Backache, Spine, Fracture, Pyelonephritis

INTRODUCTION

Congenital abnormalities mimicking fractures are rare.[1] Most of these abnormalities are asymptomatic and are a diagnostic challenge to the treating physician. Unfortunately, conventional radiological imaging may be unhelpful in differentiating congenital abnormalities such as platysopondyly from fractures.[2]

CASE REPORT

A 35-year-old previously healthy man had a fall from a height of 18 feet and was admitted to a surgical ward with backache. X-ray of the spine revealed a "wedge fracture" of the 12th thoracic vertebra (Fig. 1, 2).

Fig. 1: Radiograph of the spine lateral view showing wedge indicated by arrow

Fig. 2: X-ray spine AP view showing the bony defect with arrow

There was no record of any significant past medical history including urinary tract infections or pyelonephritis. There was no recorded fever. Thus, the management was mainly directed towards orthopedic care, specially, stabilization of spine following referral to an orthopedic surgeon. In spite of the management he continued to have backache. On the 14th day after the fall he became confused, but was not febrile. The condition worsened and he succumbed on the 15th day.

Since it was considered to be a death following accidental trauma, an inquest was ordered and the body was subjected to a medico legal autopsy under the authority of the Inquirer in to Sudden Deaths. The body was that of a well-nourished and well-developed man, 64" in height. There were no external injuries. There was an anterior wedge shaped defect in the spine with no associated hemorrhage. There was subcutaneous and muscle contusion of the right sacral area with no associated bony injuries (Fig. 3).

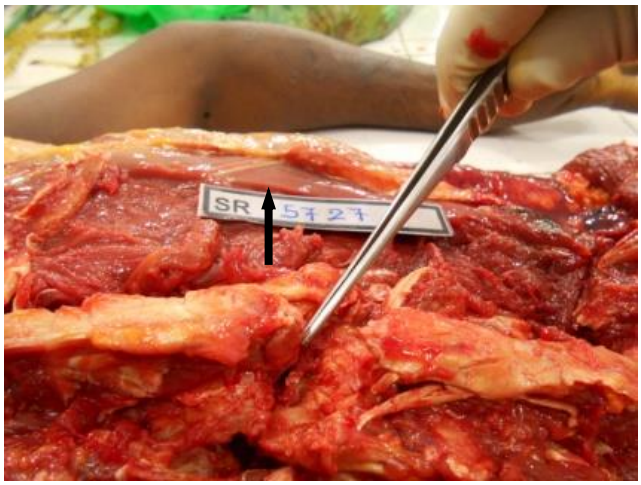

Fig. 3: Dissected spine showing the non haemorrhagic gap between 12th Thoracic and 1st lumbar vertebrae.
Arrow pointing toward the contusion over the sacrum.

The kidneys were enlarged, congested, oedematous with multiple abscesses.
(Fig. 4).

Fig. 4: Kidneys showing small white/pale abscesses on sub capsular surface.

Histology revealed acute on chronic pyelonephritis (Fig. 5). No other pathology was noted. The cause of death was concluded as pyelonephritis and the circumstance was natural.

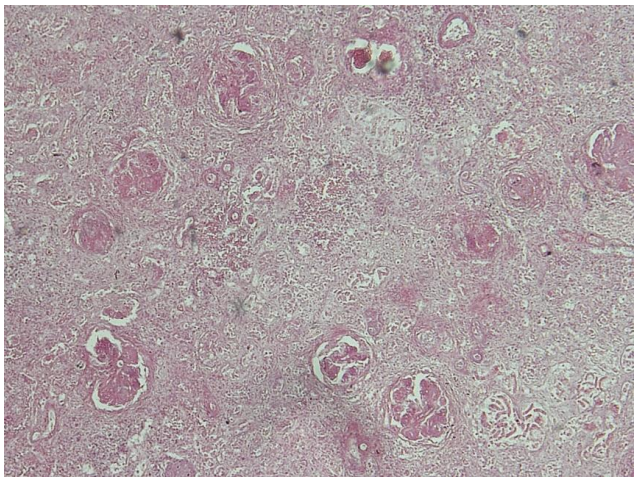

Fig. 5: Microscopy of the kidney with acute on chronic pyelonephritis.

DISCUSSION

There are four basic mechanisms of vertebral injuries: flexion, extension, shearing, and rotary movements.[3,4] Lumber vertebral wedge fractures are known to occur in falls from height.[5] Although back pain is often caused by injury and evidence of spinal trauma can easily be evaluated and is obvious, it is important to focus on other pathologies especially when the pain is not responding or worsening during the course of treatment. Attention should have been paid to exclude other potentially life threatening conditions.

Back pain may have many other underlying reasons. Aortic aneurysm, myocardial infarction, acute pancreatitis, duodenal ulcers, gynecological conditions, renal calculi, acute pyelonephritis and urinary tract infections are some of the serious conditions that can present with back pain needing urgent attention.[6,7] This 35-year-old man was ultimately diagnosed to have pyelonephritis, which explains his worsening back pain irrespective of the management of trauma.

Pyelonephritis can cause lower back pain. The condition can be potentially lethal if unattended. Accurate and timely diagnosis and treatment can prevent serious complications.[8]

When there is a congenital abnormality of the spine mimicking a fracture in a man who presents with backache after falling from a height, other possibilities of backache could be missed.

Subtle difference in the symptoms in other causes of backache and confusion due to referred pain may mislead physicians. The clinical diagnosis of pyelonephritis is made on the history, physical examination, and urine analysis. Pyelonephritis may result in high fever and costovertebral angle tenderness with pain over the costovertebral angle on percussion. However, absence of fever and attribution of loin tenderness to trauma could be the reasons for misdiagnosis in this case.

Differential diagnosis between vertebral fractures and congenital or preexisting abnormalities can present a major clinical challenge, especially when the presentation is post traumatic.[2] In this regard, a careful radiological evaluation is essential in order to make a correct diagnosis. However, patients may have conditions that mimic the imaging appearance of a lesion.[9] Developmental anomalies of vertebrae may occur anywhere throughout the length of the spine and could affect any part of the vertebrae.[10] This patient had a non-hemorrhagic wedge shaped defect involving the anterior part of the 12th thoracic vertebral body, which is known as hemivertebrae. This defect can be asymptomatic especially when it involves the thoracic or lumbar spine.[11,12] Congenital or developmental disorders of the spine are known to mimic fractures.[13] Especially in falls from a height, anterior wedge fractures or compression fractures are commonly observed, which have a similar radiological appearance to this defect.[14] However, at autopsy, absence of the haemorrhage confirmed that the condition was pre-existing.

In conclusion, when a potentially treatable condition is undetected till death, in a patient receiving medical care, the family, the public, as well as the judiciary, may raise the question of medical negligence. Successful conviction of medical negligence needs establishment of establishment of a doctor-patient relationship, harm to the patient, failure to provide the required standard of care under the circumstances by the doctor, and the harm being a result of such failure. In this case, the patient was admitted and managed for backache following trauma which establishes the doctor-patient relationship. He succumbed with worsening backache due to undetected and unattended pyelonephritis. Whether there is failure of any standard of care needs careful evaluation with application of Bolam as well as Bolitho's principles.[15] If there is evidence of failure of standard of care leading to non-diagnosis of pyelonephritis, supported by a responsible body of similar professionals considering the presentation and the presence of the misleading vertebral defect, this case could be considered as a case of medical negligence.

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UNREPORTED OFTEN CONFRONTED POSTMORTEM ARTIFACT; "POSTMORTEM CONTACT MACERATION"

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INTRODUCTION

Maceration is defined in surgical practice as softening of tissues by soaking until connective tissue fibers are teased apart.[1] Factors which influence it's onset are volume of fluid, time duration, heparin binding protein, bacterial toxins and proteolytic enzymes. Histology reveals high water content in epidermis and dermis.[2]

Maceration is a well-known finding in forensic practice seen in dead bodies recovered from water, where the skin appears pale, swollen and wrinkled. Maceration usually takes more than one hour to develop and is first visible on areas where the skin is thick, like palm, sole, knee and elbow.[3] Similarly, maceration is seen in the living around wounds due to exudates and dressings and elsewhere due to prolong contact with urine and sweat.[4]

It was noted that some dead bodies kept in the mortuary (which were not recovered from water) also showed pale, slightly oedematous and wrinkled patchy areas of skin with different shapes visible as early maceration. This has not been reported in forensic pathology literature.

Key words:
Maceration, Postmortem Artefact, Time Since Death

Observations at postmortem examinations

Fig. 1: Maceration of skin of adjacent body parts in close contact.

Fig. 2: Pale, slightly oedematous and wrinkled skin of axilla

Fig. 3: Pale, slightly edematous and wrinkled skin of elbow

Fig. 4: Contact maceration of axilla upper arm and upper chest.

DISCUSSION

Dead bodies kept in mortuaries without contact with water had shown patchy areas of slightly pale, swollen and wrinkled skin beneath tight clothes and when body parts were in contact with each other. Such areas can be identified as postmortem artifacts due to early maceration based on their appearance. Even though the bodies were not in contact with water, it was noted that the areas of skin which showed these changes, had been exposed to wetness due to sweat or wet clothes for a considerable time period after death. However the pale color and varying shapes could raise suspicion as to their origin. Therefore, the author believes that such lesion can be named as "Postmortem Contact maceration" (PCM).

Awareness of the presence and origin of PCM is important to prevent misinterpretation of such appearances.

The pale areas suggest close contact of adjacent body parts after death for a considerable time period which the author has observed in axilla, groin, neck, front of elbow, between female breasts and chest wall, back of knee and any body parts in contact with each other (Fig. 1,2,3,4).

The author has also noted PCM beneath wet clothes.

Postmortem contact maceration may be helpful to estimate time since death and time period of contact between two surfaces. Before labeling a pale area as PCM it is important to differentiate it from antemortem maceration due to prolonged contact with liquids (eg. water) and fungal infections of skin folds. Maceration due to drowning and PCM can be easily differentiated as in drowning, maceration develops first in thick skin while PCM can occur in any part of skin irrespective of thickness. In contact maceration, the shape of the pale, patchy area corresponds with the contact surface (eg. moist cloth, moist body part) while in drowning the shape of the macerated area depends on the body area with the thick skin. Histological changes of skin in PCM, postmortem time interval related to appearance of PCM and changes of PCM when contact is released are areas that need further investigations.

CONCLUSION

"Post mortem Contact Maceration" is an unreported postmortem artifact visible as slightly pale, wrinkled and swollen skin areas of different shapes due to contact with moist object or contact of two moist body parts over period of time. PCM would be useful in estimating time since death and time period of contact.

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ELDERLY VICTIMS DYING OF UNNATURAL CAUSES: A RETROSPECTIVE DESCRIPTIVE STUDY FROM RAGAMA, SRI LANKA

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ABSTRACT

Even though life expectancy among the elderly has been improving health hazards due to unnatural causes are a significant medical and social issue among this group.

The objective was to determine the causes and epidemiological aspects of unnatural deaths in the elderly.

A retrospective descriptive study conducted for a period of 3 years, at a tertiary care hospital of Sri Lanka where information was collected from hospital records and post mortem reports of persons above 60 years of age, who died due to unnatural causes revealed that a majority of deaths were due to road traffic accidents of pedestrians.

Key words:
Unnatural Deaths, Elderly, Road Accidents, Suicides, Homicides.

INTRODUCTION

Although ageing is a dynamic biological process beyond human control, defining old age has been widely debated because it is related to the functional ability of the workforce, which can vary with a country's political and economic situation. Many countries define old age as the retirement age i.e. 60 or 65 years. World Health Organization in its working definition defines old age as above 60 years. According to the Department of Census and Statistics of Sri Lanka, there are 2.5.million people, or 12.5% of the total population above the age of 60 in Sri Lanka. It is estimated that Sri Lanka will have an elderly population of about 3.6 million by 2021, which is 16.7% of the total population.[1] Elderly or old age includes ages reaching or exceeding the average life span of human beings. It is expected that the country is going to face many challenges due to this rapidly increasing ageing population. While frequently observed natural illnesses associated with old age such as Alzheimer's disease, cardiovascular diseases, cancer, arthritic conditions and osteoporosis and physical disabilities are expected to rise and pose a significant burden on the health budget, there are many unnatural conditions causing ill-health among these individuals. These unnatural conditions causing ill health in the elderly do consume a disproportionate quantum of medical resources due to physiological changes associated with ageing. Even low energy trauma can be lethal among the elderly due to preexisting medical conditions, age associated diminished respiratory and cardiovascular reserve/functions and insufficient ability for systemic compensation.[2,3,4]

Every year, over a million and a half people worldwide die from preventable unnatural causes or acts of violence, that include 800 000 suicides, 50 000 homicides and 300 000 war deaths.[5] On the other hand, when deaths occur due to unnatural reasons i.e. External causes such as injury/trauma or poisoning etc., and where the manner/ circumstance could be homicidal, suicidal or accidental, there is an immeasurable impact on the society, and the lives of the survivors are often changed irrevocably by these tragedies.[6,7,8,9] This is especially true for the young. However, when the victim is old and friable the public interest in such deaths may not be the same as that for the young. On the other hand, due to the serious, chronic illnesses suffered by these victims, attending physicians are often happy to sign death certificates without personally investigating the circumstances. Thus, unnatural deaths of the elderly are significantly underreported.[10] On the other hand, the forensic pathologist may face a challenge in assisting to investigate the circumstances of death in elderly due to many natural conditions contributing to the death of these victims.

OBJECTIVES

To determine the epidemiological aspects, causes, mechanisms of injury and the contribution of natural co-morbidities in unnatural deaths in the elderly.

METHODOLOGY

Data were collected retrospectively for a period of 3 years, from hospital records and post mortem reports of a tertiary care hospital of Sri Lanka regarding persons above 60 years of age, who died due to unnatural causes. The historical details, scene findings, autopsy findings, investigations, opinion and conclusions given were obtained. Cases where data was incomplete or doubtful were excluded from the study.

RESULTS

Table 1: Age distribution

Fifty five (59.8%) were male and 37 (40.2%) female. Majority 24 (26%) were of the age group of 65 - 69 followed by 70 - 74 (23%). The frequency of deaths due to unnatural causes were less among persons over 75 years of age. (Table 1).

Age group (Yrs.)	Number	Percentage
60 - 64	20	22
65 - 69	24	26
70 - 74	21	23
75 - 79	14	15
>80	13	14
Total	92	100

Table 2: Circumstances of death

Majority of deaths were accidental 63 (68%) followed by suicidal 21 (23%) (Table:2)

Circumstances	Number	%
Accident	63	69
Suicide	21	23
Homicide	5	5
No data	3	3
Total	92	100

Table 3: Management details

While a majority 43 (47%) of victims had received initial treatment at the Emergency Treatment Unit (ETU) or the surgical ward, 41 (45%) were brought dead to the hospital (Table:3).

Received treatment	Number	%
Emergency care only	1	1
ETU/Ward	43	47
Specialized care/surgery/ICU	3	3
Brought dead to hospital	41	45
No data	4	4
Total	92	100

Table 4: Location of injuries

Injuries were located in multiple body parts in 31 (34%) or on the head and neck in a majority 26(28%). (Table:4).

Location of injuries	Number	%
Head, face and neck	26	28
Chest and abdomen	5	5
Multiple body parts	31	34
No external injuries	9	10
Chest only	1	1
Abdomen only	1	1
Lower limb	3	3
Head and chest	6	7
Head, chest and abdomen	10	11
Total	92	100

Table 5: Cause of death

Cause of death in a majority of cases 34 (37%) was cranio-cerebral injuries (Table :5).

Cause of death	Number	%
Craniocerebral injury	34	37
Other	2	2
Unascertained	1	1
Snake bites	3	3
No data	1	1
Chest injury	4	4
Abdominal injury	1	1
Multiple injuries	17	19
Neck compression	6	7
Drowning	8	9
Shock and haemorrhage	4	4
Burn	3	3
Poisoning	8	9
Total	92	100

Table 6: Past medical history

There was a history of natural disease in a majority 51 (55%) with many suffering from ischaemic heart disease 34 (37%) (Table :6).

However, natural pathology contributed to death in only 8 (9%).

Presence of a natural disease	Number	%
Hypertension	5	5
Diabetes mellitus and hypertension	3	3
Ischaemic Heart Disease	21	23
HT/DM/IHD	5	54
IHD and HT	8	9
Other	9	10
None	41	45
Total	92	100

Table 7: Type of accidental death

Most accidental deaths were due to road accidents 50 (79.3%) followed by falls from a height 3 (4.8%). (Table: 7)

Type of accidental death	Number	%
Road Accident (RTA)	50	79
Fall from height	3	5
Burns	2	3
Drowning	2	3
Railway accident	1	2
Other (snake bites, etc.)	5	8
Total	63	100

Table 8: Type of suicidal death

A majority of suicides were due to poisoning 8 (38.1%) followed by hanging 6 (28.6%), drowning 4 (19%), rail track trauma 2 (9.5%) and burns 1 (4.8%). (Table: 8)

Type of suicidal death	Number	%
Poisoning	8	38
Hanging	6	29
Drowning	4	19
Burns	1	5
Railway accident	2	10
Total	21	100

Table 9: Victim profile in road accidents

Most of the victims of road accidents 37 (74%) were pedestrians. (Table: 9)

Victims in RTA	Number	%
Pedestrian	37	74
Driver	6	12
Passenger	7	14
Total	50	100

Table 10: Age distribution of different types of accidental deaths

Road accidents were commonly observed among the age group of 65-74 (54 %) while there was no significant age preponderance in other types of accidents. (Table: 10)

Age Type	60- 64	65- 69	70 -74	75 -79	>80	Total
RTA	9	12	15	8	6	50
fall from height	2	0	0	1	0	3
Burns	0	0	1	0	1	2
Drowning	1	1				2
Railway accident	0	1	0	0	0	1
Other	1	1	0	1	2	5
total	13	15	16	10	9	63

Table 11: Age distribution of suicidal deaths

Suicidal deaths were commonly observed in the 60- 64 age group (Table: 11). The reason for suicide was not known by the relatives in a majority.

Age group (yrs.)	Number of suicides	%
60- 64	6	29
65 -69	4	19
70 - 74	4	19
75 -79	4	19
>80	3	14
Total	21	100

DISCUSSION

Elderly victims subjected to trauma or violence have an increased risk of death in relation to their younger counterparts and are more likely to die of medical complications. Study revealed that the sex ratio of unnatural deaths of elderly follows the national statistics where most of the unnatural deaths are recorded among the males compared to the females.[11] This is shown in studies done in other countries as well.[12] This could be explained by the lifestyle and behavioral risks of men compared to women.

Study revealed that a majority of the victims were less than 75 years old or in an independently mobile age group. Accidental deaths predominate followed by suicides. The same pattern was observed in studies done in other countries.[13,14]

A majority had died on the spot or had lived until they got basic initial management which indicates the seriousness of their injuries. This can be further explained by the presence of multiple injuries or cranio cerebral injuries in a majority. This contrasts with studies worldwide, where it was highlighted that injuries to the extremities are the commonest type of injury in elderly.[15]

Demetriades D et al has revealed that the survival of elderly patients after trauma could be improved with early intensive monitoring, evaluation and resuscitation.[16] Thus, the victims with injuries to the extremities may have survived with resuscitation and may not have been included in the study.

A majority had a past medical history of a significant illness, especially ischaemic heart disease. Elderly patients and in particular those with pre-existing medical conditions are known to be at an increased risk of mortality following injuries of minor to moderate severity.[17] However, the contribution of such natural conditions to the cause of death was identified in only 9%. This further confirms the seriousness of the injuries where injuries themselves were lethal enough to cause death.

Of all accidental deaths, 79% were road accidents where the victims were mainly pedestrians. Similar patterns were observed among the elderly in a study done in neighboring India.[18] National Statistics of Sri Lanka show that there is an increasing trend of road accidents in Sri Lanka. However the majority of victims are drivers or riders, followed by pedestrians, irrespective of age.[12] This pattern among elderly can be explained by the fact that many do not engage in driving and the fact that due to associated medical conditions or disabilities they are more prone to accidents as pedestrians. Falls are the second most common form of accidental death followed by burns and drowning but the number is significantly low. Accidental falls are identified as an important cause of morbidity and mortality in elderly.[19,20] Similarly, the fact that aged patients are vulnerable to burn injury, and have far worse treatment outcomes compared to young adults is generally agreed.[21]

The study showed that there is a significant risk of suicide among the elderly where most (29%) are of the age group of 60 - 64 or just after retirement. A majority had consumed a poison. However, suicide in old age is a much neglected area worldwide due to lack of knowledge among the physicians.[22]

Sri Lanka shows the 4th highest suicide rate in the world[23] and during 2010 to 2012 there was an increasing trend of suicides with age. According to the World Health Organization, in most countries, suicide rates tend to rise as a function of age for both men and women.[24]

Though there is a significant decrease of pesticide poisoning after 1995 in Sri Lanka, even in 2011, it remains the commonest method of suicide, followed by hanging, which was highlighted in our study as well.[25] Elderly people select the easily

accessible modes as methods of suicide, and in most developed countries, with the presence of skyscrapers, falls from a height are much commoner.[26] Our study revealed that there is a significant number of suicidal deaths due to drowning as well. Sri Lanka, being an island with ample resources of water with easy access may make this possible for the elderly.

It is important to study the unnatural circumstances of death among senior citizens of a country to identify the reasons for the untimely, unnatural mortality in order to plan appropriate intervention strategies. Further, this will create awareness among the public of such possibilities, which in turn will give serious concern to the death of the elderly. The study revealed that the majority of these unnatural deaths are due to road accidents, where elderly victims were pedestrians, highlighting the need for supervised transportation. On the other hand, the presence of a significant number of suicides among elderly emphasizes the need for counseling services targeting this group.

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REVIEW

TISSUE DONATION AND TRANSPLANTATION PROGRAM IN SRI LANKA
A Medico-legal point of view

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ABSTRACT

Tissue donation and organ transplantation plays a key role in the management of the critically ill patient.

The harvesting of organs for transplantation is done according to the legal framework of the country and based on circulars, protocols and guidelines of health and legal authorities. Clear knowledge regarding medico-legal issues and ethical aspects are mandatory for an effective transplantation program.

The authors attempt to critically evaluate the medico-legal and ethical aspects pertaining to the existing system for tissue donation and transplantation in Sri Lanka and compare the local provisions with those existing in other countries. It is envisaged that this would enable identification of amendments required.

Keywords: ***Tissue donation, Organ transplantation, Medico-legal aspects, Ethics, Living donation***

INTRODUCTION

Even though transplantation is life-saving therapy for end stage organ failure only about 10% of the global need is met.[1,2]

Each day, about 60 people around the world receive an organ transplant, while 13die due to non-availability of organs.[3] The World Health Organization (WHO)' reports that the majority of transplanted organs across the world are from live donors. In UK, the annual number of live donors is equal to that of dead donors. In most developing countries, almost all kidney transplants are from live donors. In the year 2017, around 400 kidney transplantations had been done in Sri Lanka, while more than 2000 patients had died due to renal failure while awaiting transplantation.[4] Approximately, 34,768 organ transplantations had been done in United States in 2017.[5] While the approximate ratio of organ transplantation per total population is 1: 9,408 in USA it is 1: 52,477 in Sri Lanka.

There is a significant gap between supply and demand of organs which has resulted in long waiting lists for organ transplantation. In Sri Lanka this organ shortage is mainly due to a trend towards living rather than cadaveric organ retrieval. Medical officers have been appointed at national and local level by the Ministry of health in Sri Lanka to coordinate the national transplantation program effectively. They coordinate both live and cadaveric donations in varying capacities (eg., talking to recipients and donors, coordinating the process etc.). However, it appears that the involvement of nongovernmental organizations with the national program is significantly less than that of other developing countries like India. Reviewing the current program intermittently and on regular basis, identification of issues and addressing them accordingly with input from international stakeholders are mandatory to achieve a successful organ transplantation campaign locally.

Recent advances in the field of transplant surgery along with significant improvements in the quality of the life after transplantation, has resulted in an increasing trend towards organ transplantation among end stage organ failure patients in Sri Lanka. However, it is associated with medico-legal and ethical dilemmas and controversies. One such issue related to retrieval of organs for transplantation is the point at which retrieval should be done; whether after brain stem death or after whole brain death.

In Sri Lanka, the Transplantation of Human tissues (THT) act No 48 of 1987 (certified on 11th December 1987) and the Director General Health (DGHs) circulars of Ministry of health on organ Transplantation lay down procedures for the donation and removal of human bodies, organs and tissues for therapeutic, scientific, educational and research purposes. However, there are differences in interpretation and contradictions between the currently practiced laws in Sri Lanka and those of other countries. Clear knowledge regarding this aspect among medical practitioners will help the organ transplantation team to retrieve high quality organs from potential cadaveric and live donors. When organs are transplanted according to a prescribed medico-legal and ethical framework, it would reduce the risks to the live donors, may save valuable human lives and result in an effective transplant program in Sri Lanka.

Living donations

A living donation takes place when a person donates an organ to another whilst alive.[6] Around 6000 living organ donations are being reported each year in USA.[7]

Most living donations happen among family members or between close friends. People who choose to donate to unknown persons are considered as altruistic living donors. Organs or tissues that can be donated during

life are either paired organs (eg, kidneys) or regenerative tissue (liver, lung, pancreas, intestine).[8]

In cases where living organ donors are genetically related to the recipient there is a considerable risk of the recipient acquiring genetically related disorders later in life due to shared inheritance of genetic variants or common environmental exposure that increases susceptibility to organ failure.[9] Related living kidney donors are at higher risk of end-stage renal disease compared with unrelated living kidney donors.[9]

Living organ donations have several ethical considerations. During transplantation, the transplantation surgeon may endanger the life of a healthy individual to save the life of the patient. Therefore some argue that living donation should be abandoned.[10]

Therefore in cases where it is necessary to retrieve organs from live donors for transplantation, the following aspects/guidelines should be adhered to by medical practitioners.[11]

1. Ensure that there is a reasonable prospect of the transplant being successful. If prospects of success are remote transplantation should not be carried out despite consent for donation.
2. Ensure that benefit to the recipient far outweighs the likely detriment to the donor.
3. Ensure that the donor is capable of providing valid consent (free /voluntary/well informed / written / witnessed).
4. Do not encourage a potential donor to donate organs.
5. In case of paired organs, make sure that the other organ is healthy and will sustain life of the donor with minimal handicap.
6. No consent must be obtained nor valid for the donation of organs essential for the life of the donor (eg: removing the large part of a regenerative organ risking the donor).

If a donor experiences an adverse effect it would have a negative impact on the entire transplant team and the institution. In order to avoid such repercussions the transplantation procedure should take place according to precise criteria and the law of the country. Therefore donors should be treated in a respectable manner without compromising principles of autonomy and beneficence and keeping in mind the principle of non-maleficience. In cases of legal consequences the donor could be a witness and could provide evidence in court.

Donations upon death

A person will be considered dead if he has experienced an irreversible cessation of spontaneous respiratory and circulatory functions. However in the event that life is supported by artificial means, a person will be considered dead if he has experienced an irreversible cessation of spontaneous brain functions.[12]

Although donations of organs/tissues upon death is rare (except corneal donations), it is practiced in Sri Lanka. According to the Transplantation of Human Tissue Act of 1987, any person above the age of twenty-one years may consent in writing to the donation, to take effect upon his death, of his body or any part thereof or any tissue. Such consent given during life should not have been revoked thereafter. In cases where the deceased has not given prior consent for a donation effective upon death, it shall be lawful for the next of kin of such deceased person, who is above the age of twenty-one years to give consent, if the deceased during life has not objected to donation.[13]

Although persons above the age of twenty-one years can donate their organs according to the law of many countries including Sri Lanka, age is a known factor that influences the success of transplantations. Transplantation of liver from the individuals above the age of 55 years[14-17] or renal transplants from individuals more than 65 years have shown a higher failure rate than donations from younger individuals.[18,19,20]

It has been reported that with increasing age, the number of organs discarded increases.[21]

Harvesting good quality organs from cadavers under the prescribed manner according to the law of the country helps to save valuable human lives.

Road traffic accidents, suicides and homicides leads to brain death of individuals due head injuries, leaving potential organ donors.[22] In 2016, 3003 deaths occurred due to road traffic accidents and 502 deaths due to homicide in Sri Lanka.[23,24] Majority of victims were young or middle aged. Suicide has been a leading cause of death in the 16 to 24 year age group while homicide was a leading cause of death in those between 21 to 40 years of age.[25,26] When considering homicides in Sri Lanka, it has been identified that the common regions affected are chest and head.[26] These victims are potential kidney, bowel, pancreas and liver donors. If consent had been given by them for organ donation previously or if their next of kin consents for organ donation the requirement for living donations would be less. Where the circumstance of death is "unnatural", the criminal procedure code of Sri Lanka dictates that the release of bodies are subjected to an inquest followed by autopsy examination.[27] Even though this is a traumatic time for the relatives there is an important duty with the medical practitioner to confirm death, arrange for a postmortem examination and consider the possibility of organ donation. If a recognized data base of potential donors or a donor card system exists, the retrieval of tissues upon death could be done without undue delay. It is timely that we institute such a process to help expedite the process of harvesting of organs from the dead.

Process of Organ retrieval for organ transplantation in medico-legal cases

In Sri Lanka, under the provisions of the criminal procedure code, release of the dead body in a medico-legal investigation is subject to an inquest followed by autopsy examination.[4] After brain death is confirmed and when consent has been obtained for retrieval of organs for transplantation, the JMO on duty and the coroner will be informed as such in writing. The coroner has to authorize organ retrieval by the transplantation team in the presence of the JMO, who is part of the team. It is mandatory that the JMO documents the details of the procedure and submit a report thereafter. Further, the organ retrieving surgeon will provide a comprehensive report regarding the procedure carried out, findings and the condition of the retrieved organs in accordance with the guidelines provided in the DGHS Circular No: 01-37/2010. This report which should include the following information is essential for subsequent medico-legal procedures.

a) Details of the deceased- Name/Age/gender/ address/Bed Head Ticket number
b) Date, time and place of the procedure
c) Name of the organ/s
d) Side of the organ (e.g. Left /Right)
e) Weight of the organ/s
f) Size of the organ retrieved
g) Macroscopic appearance
h) Surgical procedure with details of the incisions and date/time and name/s of the transplant team
i) Color photograph of the organ with a scale (preferable).

The JMO who conducts the autopsy subsequent to harvesting at the request of the ISD/Magistrate, will attach the report submitted by the surgeon who has retrieved the organs along with the formal autopsy report.[4,13,27]

The current practice in Sri Lanka with regard to organ retrieval from a victim of violence on artificial life support who is deemed brain dead (beating heart cadaver) is to obtain a magisterial order for organ removal by forwarding a "B" report to court through the investigating police officer or a lawyer of the transplantation team. However, sometimes organ removal and transplantation takes place with the

concurrence of the JMO and inquirer with assistance of the investigating police officers. Therefore, specific guidelines for retrieval of organs from persons who are brain dead need to be streamlined.

Difficulties are also encountered when victims of violence are transferred from distant health units under the jurisdiction of different police and court areas and may result in delay. This delay while providing relatives the time to think about donation may also result in withdrawal of consent. It is further complicated if the victim's identity is not established at the time of diagnosis of brain death and organ retrieval. The issue of identity should be addressed in future amendments to the Criminal Procedure Code to streamline and expedite the process.

Brain death

There are three types of brain death, they are cortical death, brain stem death and whole brain death.[28]

Cortical death is better known as a vegetative state, where person can no longer be recognized as a "social man".[29]If the vegetative state continues for more than 1 month it is known as the persistent vegetative state. However, the Sri Lankan law does not identify the persistent vegetative state as a specific entity and medical professionals treat the person as in a deeply comatose state.[30]

In the United States, The uniform determination of death Act , 1981 has defined death as either irreversible cessation of circulatory / respiratory function or irreversible cessation of all functions of the entire brain, including the brain stem.[31]In Sri Lanka, The Transplantation of Human Tissues Act (No.48 of 1987)section 15, has defined death as irreversible cessation of all functions of the brain, which may be determined by the prolonged absence of spontaneous circulatory and respiratory functions which shall be determined by any means recognized by the ordinary standards of current medical practice. Medical professionals frequently encounter ethical and legal dilemmas when determining the time of death of eligible organ donors on artificial life support.

Certification of brain death

In United Kingdom, clinical diagnosis of brain stem death can be made by clinical testing alone by two medical practitioners holding full GMC registration for more than 5 years, one of whom should be a Consultant, sufficient for diagnosis of brain stem death as long as they are competent to undertake the tests, experienced in interpreting the results, and should be independent of the transplant team.[28]

In India, for the clinical diagnosis of brain death, two certificates are required 6 hours apart from doctors and two of these have to be doctors nominated by the appropriate authority of the government with one of the two being an expert in the field of neurology.[32]

However in Sri Lanka, clinical diagnosis of brain death can be made without a consultant or an expert in the field of neurology but as in UK, and in India[33]the medical practitioner who is certifying the death is independent of the transplantation team.[13]According to the DGHs circulars on organ Transplantation, certification of brain death for patients on ventilatory support systems is made by two doctors(Anesthetist/ Medical Officer, Intensive Care Unit), independently twice each, one of whom at least should be a senior doctor 5 years after qualification, preferably with a specialist qualification.

Sri Lanka is a country where most hospitals have one or two ICUs with a single anesthetist in charge of the ICU and surgical theatre. The anaesthetist is also part of the transplantation team. However, legally, the diagnosis of brain death should be made by the two doctors who are independent of the transplant team. Therefore it is timely that we adopt criteria used in UK and India to make amendments to the health circulars for

those involved in diagnosis of brain death especially for transplantation purposes.

Circulatory death (non-heart-beating donation)

Organ donation after cessation of cardiac pump activity is referred to as non-heart-beating organ donation (NHBD). NHBD donors can be neurologically intact; they do not fulfill the brain death criteria prior to cessation of cardiac pump activity.[34]The number of NHBDs are gradually increasing and represents around 11.3% cadaveric donation in UK.[35]Many countries are following NHBD and primarily strict to the Maastricht protocol.[36]

The fundamental problem with NHBD is warm ischaemia, which may lead to suboptimal function of transplanted organ. Steps need to be taken for organ protection by adopting strategies to keep warm ischaemia times as short as possible which will lead to more successful outcomes from non-heart-beating donors.[37]

Solid organs suitable for transplantation from non-heart beating donors include kidneys, livers and lungs.[32]

The Sri Lankan Transplantation of Human Tissue act (No.48 of 1987) section 15 defines death as irreversible cessation of all function of the brain and therefore provides no opportunity harvesting organs from NHBD. Therefore it is timely that this be addressed in the near future.

Consent for adult organ donation

In Sri Lanka, any person who is alive and above 21 years of age can give consent to the donation of his body, organs or tissue, which will be effective after his death.[13]

The next of kin of any deceased person, who is above 21 years of age, may give consent for removal of the body, any part thereof or any tissues of deceased person who has not given prior consent for organ donation but, had not expressed any contrary intention at any time during his life.[13]

Prisoners

Any part or any tissue can be removed from a prisoner who dies inside a prison, if the prisoner had given consent for donation effective upon death; and had not revoked such consent.

Organ donation in children

Around 81% of childhood deaths occur due to accidental causes in Sri Lanka. Among them, the most frequent cause of death which is drowning, accounts for 33% of childhood deaths.[38]

Anencephaly is a congenital condition where the infant is often stillborn. However a small percentage may remain alive for days to months. These infants do not meet the existing brain death criteria. Therefore obtaining transplants from such cases would raise numerous ethical and legal issues.[39] According to section 306 of the penal code of Sri Lanka, there is strict prohibition on abortion, with the only exception being to save the life of mother. In February 2013 suggestions to amend the penal code section 306 of 1995 were made in order to relax the strict prohibition on the termination of pregnancy in cases of congenital abnormalities incompatible with life /serious foetal impairment. [40]However, this did not become a reality. The incidence of anencephaly births during the year of 2005were 292in Sri Lanka ,15662 in India 886 in UK and 4318 in USA.[41]In United States one in every 4859 babies born are anencephalic and 859 cases were reported during the year of 2004 – 2006.[42] They are potential heart, liver and kidney donors.[43, 44]

On the death of any child, both parents or in the absence or incapacity of one parent, the other parent or in the absent of both parents, the guardian of such child can give consent in writing for the removal of the body or any part or any tissues.[13]

Organ storage and preservation of tissues

With the shortage of organs available for transplantation, there is an urgency for a better use of available organs. Organ preservation is crucial in the transplant process. The main goal in organ preservation is to maintain the function of the organ and tissue during storage so that the graft will function at re-perfusion.[34]

Where a tissue is removed from a human body under the Transplantation Of Human Tissues Act it shall be the duty of the prescribed technician who removes it from the body to preserve it in any such place and under such conditions as may, from time to time, be prescribed, until it is duly transplanted: However, the provisions of this section shall not apply to any case where the medical practitioner performing the transplantation considersit fit to perform the removal of any tissue from a body and the transplantation of same immediately, without sending it to any such place of preservation.[13]

It is also important to maintain a proper register for donors and recipients, maintain confidentiality between both parties and take adequate precautions in disposal of unused organs and tissues.

Disclosure of information

According to the section 18 of the Transplantation of Human Tissues Act, no person shall disclose or give to any other person any information or document (except where legally required to do so) the identity of any person.[13]

1. who has given or refused to give a consent under THT Act; or
2. with respect to whom a consent has been given under THT Act; or
3. into whose body a tissue has been, is being or may be transplanted, may become publicly known.

Further any person acting in contravention of subsection (1) section 18 of THT shall be guilty of an offence and conviction after summary trial before a Magistrate, be liable to imprisonment of either description for a period not exceeding one year or to a fine not exceeding one thousand rupees or to both such imprisonment and fine.[13]

Media

The mass media can both be useful in promoting donations as well as be potentially dangerous in adversely affecting organ donation. Any negative broadcast concerning such delicate matters as brain death, organ trafficking, or unfairness in the access to transplantation may adversely influence the attitude of the public towards organ donation.[37]Without the support of the general public and their willingness to donate there would be no organs to transplant.[37]The media can be used to reach the public and educate them through periodic meetings of journalists, experts in communication and opinion leaders in transplantation.[37]

Summary

It is clear that there is a necessity to strengthen the organ donation and transplantation program in Sri Lanka. It can be achieved through effective coordination at national and local level under the direct supervision of the ministry of health with help of other stake holders, under the guidance of the legal fraternity. Awareness programs regarding organ donation among the general public of all age groups is essential to cater to the future need. The media can be used very effectively under an ethical and legal framework to overcome the organ shortage.

Reviewing of the program intermittently to identify issues and introducing changes to health circulars and legal framework with help of stakeholders is essential for an effective program.

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