Implantable Cardioverter Defibrillator-A Review

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INTRODUCTION:

Implantable cardioverter–defibrillators (ICDs) have drawn out incalculable lives with effective treatment of abrupt cardiac arrest. Implantable cardioverter defibrillators (ICDs) are electronic devices that are unpredictably determined to identify just as terminating cardiac arrhythmias. With added abilities of demand pacing, their applications are two-fold – emergency defibrillation and reinforcement pacing. At first, viewed as a remote decision for patients with sustained ventricular tachycardia (VT), their viability is unchallenged today.

INVENTION OF ICDS IN HUMAN BEINGS AND ADVANCED DESIGN:

1980 was the landmark year that saw the first successful implantation of ICD in a human by Michel Mirowski.

The unexpected and grievous death of his associate, Dr. Harry Heller in 1966, because of Ventricular tachycardia, drove Mirowski to imagine the possibility of an ICD. In 1968, Mirowski was hired by the Sinai Hospital in Baltimore as the head of the coronary consideration unit, with plentiful time for research. The biomedical engineering division and animal laboratory of the clinic helped with research. The early natural product was the fruitful testing of the first crude prototype on a dog in August 1969. Ultimately, Mirowski and Mower accumulated help from a significant pacemaker organization in 1970 to additionally develop the ICD, just to be deserted 2 years after the fact, as the organization saw no market for the device.

In 1972, Mirowski came in contact with Stephen Heilman, a doctor cum-engineer who established Medrad, a medical equipment organization. Heilman, who was profoundly dazzled by the clever thought of ICD, set up his specialists to be available to Mirowski. This association yielded the main ICD model little enough to be embedded in a dog in 1975. A film of the first successful defibrillation of a dog embedded with the model ICD was delivered and this well-known film pushed ICD into the spotlight overnight. Further refinements in the model were made to make it reasonable for human implantation.

As a significant improvement over the early gadgets, the second-era ICDs were intended to recognize ventricular arrhythmias (VA) utilizing a probability density boundary dependent on the idea that, in contrast to sinus rhythm, ventricular fibrillation did not keep an isoelectric baseline. This empowered bradycardia pacing capacity and they were negligibly programmable. This finished the requirement for independent pacemakers. The second era ICDs could get rid of thoracotomy through the presentation of transvenous leads in 1988, which empowered the implantation method to be acted in an electrophysiology research facility as opposed to opening a medical procedure. Moreover, these devices had restricted telemetry capacity to test battery strength, for which an outside checking gadget was required. Cylindrical aluminum electrolytic capacitors and silver vanadium pentoxide batteries of the original ICDs were replaced by lithium-silver vanadium manganese oxide batteries, which brought about the longer existence of ICDs.

The first third-era ICDs were presented in the mid-1990s. The critical overhauls were the critical overhauls of anti-tachycardia pacing (ATP), low energy shocks for ending Ventricular tachycardia, a significant degree of programmability, and telemetry capacities.

ICDs could be customized into three distinctive cycle length-related zones and the discriminative detection calculations programmable in the two least zones. The most elevated programmable zone is intended for recognition of quick VT or VF with no further segregation to avoid unnecessary delay in the delivery of treatment. Furthermore, upgrades were made in leadership development. The coaxial lead plan of the first and second-era ICDs was replaced with the multi-lumen lead design in third-era ICDs. The coaxial lead had a layered plan containing a tip conductor, ring conductor, defibrillation conductor, and a protection layer between every conductor. The multi-lumen lead development depends on parallel running conductors through a single insulating body. The critical benefit of multi-lumen over coaxial leads is the way that more conductors would fit into more modest leads.

The tip and ring conductors are utilized for pacing and detecting, a defibrillation conductor for the coil situated in the right ventricle and a defibrillation conductor for the coil situated in the superior vena cava. The insulating body contains additional lumens to build the lead's resistance from a compression force.

ICDs of today or the fourth era ICDs have continuously become smaller and more refined. They weigh not more than 80–90 g and have a volume of 30 ml, estimating not exactly a centimeter in thickness.[1]

Implantable cardioverter-defibrillators are little devices that have been demonstrated to be beneficial by averting unexpected cardiovascular death, regardless of whether primary or secondary anticipation. Appropriate working of implantable cardioverter defibrillators is fundamentally subject to the "good" detecting of ventricular electrogram waves, considering the satisfactory identification of ventricular arrhythmias to convey suitable treatment of either anti-tachycardia pacing or by conveying a shock as per the distinguished rhythm.

Main function: The detecting capacity in an ICD addresses the capacity of the device to distinguish a biological or physical signal, though identification relates to the interpretation of that signal by the device.

Dissimilar to electrocardiographic examination techniques that depend on the post-investigation of recorded signals, ICDs should make decisions on the spot, and rhythm examination is a "live" process, which is mandatory for an opportune intercession when required.

The effective achievement of the chain cycle of sensing-detection therapy requires an ideal status and capacity of all ICD parts. Detecting threshold relies upon the programmed sensitivity, and most ICD brands likewise have an auto-changing sensitivity permitting saving a projected margin for R wave detection. The key sensing capacity in ICDs depends on detection rate and detection duration. However, detection in ICDs is improved by utilizing enhancers, bandpass channels, rectifiers, and auto-changing affectability.

Heart failure remains these days a significant reason for morbidity and mortality in spite of all clinical advancements, and heart failure with decreased ejection fraction is moderately a typical condition prompting ICD implantation, frequently as essential avoidance after clinical treatment has been enhanced.

Current ICDs shift extensively in insights about diagnostic data, programmability, and treatment choices; consequently, complete information on every device is important to prevent, analyze and treat any potential detecting problems. Occasions, markers, and memory investigation consider upgraded and custom-fitted programmability for ideal detecting efficacy. S-ICDs have been displayed to have useful detecting abilities, but they have a few disadvantages (for example lack of anti-tachycardia pacing, and they can't be moved up to biventricular), and these issues should be thought about before S-ICD implantation. Remote observing is an element that is still inadequately developed worldwide owing to technical challenges, but it considers the recognition of early changes in device function, therefore reducing the risk of over- or under-sensing.[2]

The prognostic advantage of the implantable cardioverter-defibrillator (ICD) has been grounded in various settings and its utilization is consequently widespread. Advanced ICD systems use transvenous high-voltage leads to act as the interface between the heart and the generator, taking into consideration the detection of cardiac activity and the delivery of both bradycardia and tachycardia treatment, including high-voltage, high-flow shocks.[3]

OUTLINE OF SUBCUTANEOUS IMPLANTABLE CARDIOVERTER DEFIBRILLATOR SYSTEM

Unlike conventional transvenous defibrillator (TV-ICD) systems with an intravascular/intracardiac lead, the S-ICD is furnished with an extracardiac, extrathoracic, and subcutaneous electrode. The defibrillation loop (8 cm long) lies straightforwardly between two detecting electrodes and the S-ICD generator act as the third electrode, utilized for detecting and defibrillation. The pulse generator fills in as a required part of the defibrillation pathway and as an optional electrode for detection. The ideal position of device leads and generators for backup pacing and defibrillation has been thoroughly assessed in animal and human subjects. Two electrodes close to the sternum and the S-ICD generator give three potential detecting vectors. Rather than the electrograms obtained with firmly divided endocardial electrodes, the S-ICD recording has a lower amplitude and recurrence content and is more susceptible to postural variation.

It looks like that of the precordial surface electrocardiogram (ECG) with indistinct P-wave, QRS, and T-wave morphology, and the device programming/calculations should handle the waveform to recognize the QRS as particular from the T wave and P wave. Pre-embed screening (examined underneath) recognizes people in whom such handling is not plausible dependent on the QRS abundance and QRS to T-wave proportion. After the S-ICD embed, the gadget will consequently pick the ideal vector to recognize the QRS from the T wave—explicitly to try not to double-count each cardiac event. A standard format is additionally put away utilizing the ideal vector. The ideal vector can likewise be chosen physically by the administrator if this is truly wanted. The capacity to suitably recognize the particular parts of the cardiovascular electrical cycle in the S-ICD sign can be influenced by concurrent components that influence the P wave, QRS complex, and T wave, like massive atrial enlargement, ischemia, bundle branch block with QRS delay, and depolarization abnormalities, just as by anatomical variations and posture, which might influence the connection between heart position and detecting terminals.

SELECTION OF PATIENT:

1. Young age [cardiomyopathies or channelopathies are ideal candidates for S-ICD]
2. Primary prevention.
3. Poor vascular access
4. Previous infection
5. Risk of infection

Not recommended for ICDs:

Patients who require chronic pacing because of the sinus node or atrioventricular node dysfunction ought not to be considered for S-ICD. The S-ICD was approved for the prevention of sudden cardiac death among candidates to an ICD without indication for anti-bradycardia pacing or CRT, recurrent monomorphic VTs responsive to ATP, or pre-existing unipolar pacemaker leads.

It is very much perceived that even though numerous patient lives are saved in this group by primary prevention ICD treatment, an enormous population never supports a single episode of hazardous ventricular arrhythmia.

SCREENING:

Pre-embed screening using surface electrodes preceding device implantation is a significant component in the clinical use of S-ICD. Because of the high danger of improper shock from T-wave oversensing, patients who fail the screen are not embedded with the S-ICD. A few gatherings have assessed S-ICD eligibility dependent on standard screening approaches exhibiting that somewhere in the range of 7 and 10% of patients fail, with a pattern towards more ineligible patients when hypertrophic cardiomyopathy (HCM) congenital heart disease is present. Screening at rest as well as during exercise testing has been proposed to keep away from overspending on the T wave. A rich survey of improper S-ICD shocks tracked down that seven of the eight T-wave oversensing occasions happened during activity and one during atrial fibrillation with a quick ventricular response. This provoked the examiners to assess all patients with inappropriate shocks because of T-wave oversensing with an activity test during which every one of the detecting vectors was evaluated, and practice continued utilizing the best vector. After enhancement and layout development, no intermittent T-wave oversensing occasions happened with follow-up past 1 year. This gathering, thusly, proposed an activity evaluating test for patients at high danger of T-wave oversensing (right bundle branch block, digoxin use, and abnormal repolarization).

TECHNIQUES OF IMPLANTATION:

The initial incision is performed laterally, nearby the inframammary wrinkle, between the anterior and mid-axillary lines at the level of the fifth or sixth intercostal space, and is used to make the generator pocket. A second 1–1.5 cm cut is placed horizontally beginning at the xiphoid at the midline, coordinated leftwards. A proprietary apparatus is utilized to tunnel the lead from the device pocket to the xiphisternum incision. The electrode is protected at the xiphisternum incision with a suture sleeve.[4]

IMPLANTATION OF ICD CONSISTS OF:

1. **Pre-procedure Electrocardiogram (ECG) Screening:**

Screening ECG test utilizing a pre-operative screening apparatus is a significant technique to ensure suitable subcutaneous detecting signals. It is crucial to improve the S-ICD system's affectability and specificity for rhythm identification and treatment and to diminish the danger of improper shocks. It is generally performed in all patients with two postures (resting and sitting or standing). The screening test might be performed physically utilizing the ECG machine or naturally (Automated Screening Tool (AST)) by interfacing the ECG electrodes to the Boston Scientific programmer. The manual screening is performed by placing the ECG machine Left Arm (LA) terminal at the planned proximal detecting electrode(around 1 cm over the xiphoid interaction and 1 cm sidelong to the left sternal boundary), setting the Right Arm (RA) cathode at the normal situation of the distal detecting terminal (14 cm better than the LA terminal on the left parasternal line) and putting the Left Leg (LL) at the expected S-ICD device site (at fifth intercostal space horizontally along the midaxillary line).

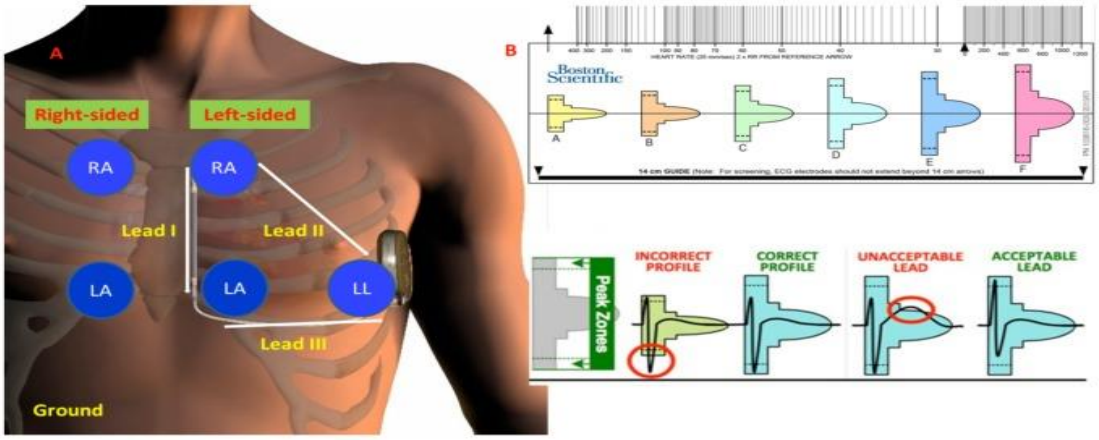

Fig1:A: Location of the surface electrocardiogram (ECG) electrodes positions during screening for eligibility for subcutaneous implantable cardioverter-defibrillators (S-ICD) in conventional left and right parasternal configurations. B: ECG screening tool with examples of acceptable and unacceptable QRS complexes and T-waves. RA: right arm; LA: left arm; LL: left leg.

2. **S-ICD Implantation procedure:** The system is typically performed in the electrophysiology laboratory under standard sterile conditions and general sedation. However, there is an expansion in S-ICD implantations with general sedation or Monitored Anesthesia Care (MAC). [10]

USE OF ICD IN OLDER ADULTS:

ICD implantation basically serves to prevent sudden cardiac arrest, for which just a solitary chamber device is vital, a large proportion of implants include either a double chamber.

Indeed, even with ideal decision-making before implantation, by far most of the patients who get ICDs will have a working device set up toward the finish of their life, and thus decisions about device deactivation are unavoidable. Additionally, even with the unexpected death counteraction given by ICDs, mortality among older ICD beneficiaries stays high, setting incredible significance on cautious development care arranging. However, patients unaware of ICD deactivation as a choice might leave patients and families ill-equipped toward the end of life. ICD shocks at end of life are difficult for patients and troubling for families.[5]

The need to completely avoid venous access issues, endovascular mechanical pressure pressure-producing lead malfunction, and extraction-related dangers prompted the completely subcutaneous ICD (S-ICD) advancement. Its unique design keeps away from endovascular leads, hence eliminating large numbers of confusion related to the traditional ICD (T-ICD). The novel gadget, created and tested over the previous decade, acquired endorsement as an acknowledged treatment for the recognition and termination of ventricular arrhythmias. The European Union approved its utilization in 2009; the U.S. Food and Drug Administration approved it in 2012. To date, six such devices have been embedded in India.

The S-ICD system identifies changes in the ventricular rate by utilizing adjusted subsurface electrocardiography through either a primary, secondary, or substitute vector.

Ideally, greater user programming experience and improvements in S-ICD technology may reduce the rate of inappropriate shocks. An increased ventricular rate during atrial arrhythmia constitutes the major cause of inappropriate shocks delivered by T-ICD systems. However, overspending T-waves or myopotential signals produce the most inappropriate S-ICD shocks. Inappropriate shocks occur more frequently in younger, physically active patients, the group most likely to benefit from the features of the S-ICD system. The addition of a second tachycardia zone to S-ICD programming may significantly reduce the rate of inappropriate shocks.

Another concern with the S-ICD system is the rate of unseemly shocks, which is seen to be 5–25% in various preliminaries, a recurrence like the noticed rate revealed in before preliminaries of the Traditional intravenous -ICD [T-ICD]. However, later T-ICD preliminaries show that newer algorithms reduce the rate of inappropriate shocks to less than 5%, proposing a benefit of T-ICDs over the current S-ICD. In a perfect world, more noteworthy client programming experience and enhancements in S-ICD innovation might decrease the pace of improper shocks. An expanded ventricular rate during atrial arrhythmia comprises the significant reason for unseemly shocks conveyed by the T-ICD device.[6]

Sudden death from cardiovascular causes stays a main source of death among patients with congestive heart failure (CHF). Treatment with amiodarone or an implantable cardioverter–defibrillator (ICD) has been proposed to work on the visualization in such patients.

ICD TREATMENT

ICD treatment was purposefully chosen to consist of shock-just, single-lead treatment.

OBJECTIVE: The main objective was to treat only rapid, sustained ventricular tachycardia or ventricular fibrillation.

No double chamber or biventricular devices were allowed. The ICD was consistently modified to have a detection rate of 187 beats each moment or more. To limit excessively rapid mediation in case of non-sustained ventricular tachycardia, anti-tachycardia pacing treatments were not allowed, given the obscure recurrence of supported ventricular tachycardia or fibrillation in the population at that point. In light of the potential for the speed increase of ventricular tachycardia and the subsequently expanded sensitivity to transient ventricular tachycardia, the utilization of anti-tachycardia pacing was considered to present more danger than an advantage. On account of the potential for anti-bradycardia pacing to deteriorate CHF, it was started provided that the intrinsic rate diminished to under 34 beats each moment, the most minimal trigger limit possible in the ICD model (Medtronic model 7223) utilized.[7]

SUBCUTANEOUS –ICD:

The S-ICD comprises a subcutaneous pulse generator that is covered in a titanium case and a subcutaneous lead. The lead is made out of a proximal and a distal detecting electrode isolated by a 3-inch shock coil. The S-ICD has no capacity for bradycardia or anti-tachycardia pacing (ATP), however, can deliver up to 30 s of post-shock transthoracic pacing. The device has two programmable zones of tachycardia location: a restrictive VT zone and a VF zone.

IMPLANTATION OF S-ICD:

The conventional S-ICD implantation is performed through three incisions: one on the left-lateral chest for the pulse generator pocket, and two parasternal incisions that allow for lead channelization. The primary incision is over the fifth intercostal space between the mid and the front axillary lines, the subsequent entry point is parasternal just beneath the xiphoid process and the third one is parasternal, at the level of the sternal notch. The pulse generator is situated in a subcutaneous pocket made on the left lateral chest. The electrode is burrowed from the parasternal incision through the pocket site and then should lie corresponding to the left half of the sternum, with its upper pole moored at the level of the third incision. S-ICD implantation is directed exclusively by anatomical landmarks, with the likelihood to affirm electrode and pulse generator position by fluoroscopy.[8]

Atrial tachycardia/flutter (AT) contrasts with those for ventricular ICDs and dual chamber pacemakers. Since AF is normally hemodynamically steady and as often as possible ends unexpectedly, it very well might be desirable to delay painful and conceivably proarrhythmic atrial defibrillation shocks for periods ≤24 hours. To

accomplish this objective, an ICD should detect low and differing amplitude AF electrograms and distinguish AF continuously. It should recognize constant AF, which might require shocks, from the end and resulting re-initiation of AF, for which shocks ought to be held back. However, atrial detecting of far-field R waves ought not to cause the improper location of AT/AF. Further, an atrial ICD ought to separate between AT, which might be ended by anti-tachycardia pacing, and AF, which requires cardioversion.[9]

Considering the limits of the TV-ICD system, an absolutely subcutaneous ICD (S-ICD) is intended to give the life-saving advantage of the ordinary TV-ICDs while staying away from the inadequacies of the TV-leads, and to improve on the embed procedures and subsequently growing the utilization of ICDs in clinical practice.[10]

The utilization of implantable cardioverter–defibrillators (ICDs) is a set-up treatment for the prevention of death from ventricular arrhythmia. However, ordinary ICDs depend on transvenous leads for heart detection and defibrillation. Complexities of defibrillator implantation have been related primarily to transvenous lead inclusion and have included pneumothorax, hemothorax, and cardiovascular tamponade. Difficulties in accomplishing venous access can draw out the strategy and incidentally result in bombed ICD implantation. In the long haul, lead failure remains a significant limit in the utilization of ICDs, regardless of many years of developments in the lead plan.[11]

Implantable cardioverter–defibrillators (ICD) have to reliably sense, detect, and treat malignant ventricular tachyarrhythmias. Inappropriate treatment of non-life-threatening tachyarrhythmias should be avoided.

Proper detection is accomplished by an automatic sensitivity control which can be independently customized to settle exceptional under-and over-sensing circumstances. The programming of identification zones for ventricular fibrillation (VF), ventricular tachycardia (VT), and zones to screen other tachyarrhythmias is laid out. Devoted single-chamber detection algorithms dependent on normal heart rate, cycle length fluctuation, abrupt rate onset, and changes in QRS morphology as utilized in ICDs by BIOTRONIK are described exhaustively.[12]

The Implantable Cardioverter Defibrillator (ICD) is a device that is surgically embedded into patients' chest for (1) the constant monitoring and pacing of the heart rhythm; anti-tachycardia pacing (ATP) which includes conveying a progression of low-energy impulses to return ventricular arrhythmias; and defibrillation where a solid electrical shock is delivered to restore the pulses once more.

CLASSIFICATION OF ICD SHOCKS:

The shock episodes experienced by participants can be classified into: (1) objective shocks, which refer to the actual shock therapies that were delivered and recorded by the ICD; and (2) phantom shocks, the phenomena where participants reported that sensations of shock were found to be unrecorded during ICD interrogations.

The shock episodes experienced by members can be ordered into:

(1) Objective shocks: Which allude to the real shock treatments that were conveyed and recorded by the ICD;

(2) Phantom shocks: The peculiarities where members detailed that vibes of shock were viewed as unrecorded during ICD cross-examinations [13]

WEARABLE CARDIOVERTER DE-FIBRILLATION:

The wearable cardioverter-defibrillator is a noninvasive device utilized briefly for the prevention of SCD in assumed high-hazard patients, which don't meet ICD implantation rules based on current guidelines. So far, just a single wearable cardioverter-defibrillator (WCD) is endorsed for clinical use (LifeVest, ZOLL, Pittsburgh, Pennsylvania, USA). The device is a wearable vest with built-in electrodes for rhythm detecting, and pads on

the off chance that a shock should be conveyed. The WCD can distinguish ventricular tachycardia and ventricular fibrillation utilizing a calculation dependent on programmable heart rate cut-off values and ECG morphology examination.

INDICATIONS FOR WCD:

1. Ischemic Cardiomyopathy

2. Non-ischemic Cardiomyopathy

3. Heart Transplantation

4. Renal Failure

5. Myocarditis

6. Inherited Channelopathies

7. Children and Adolescents [14]

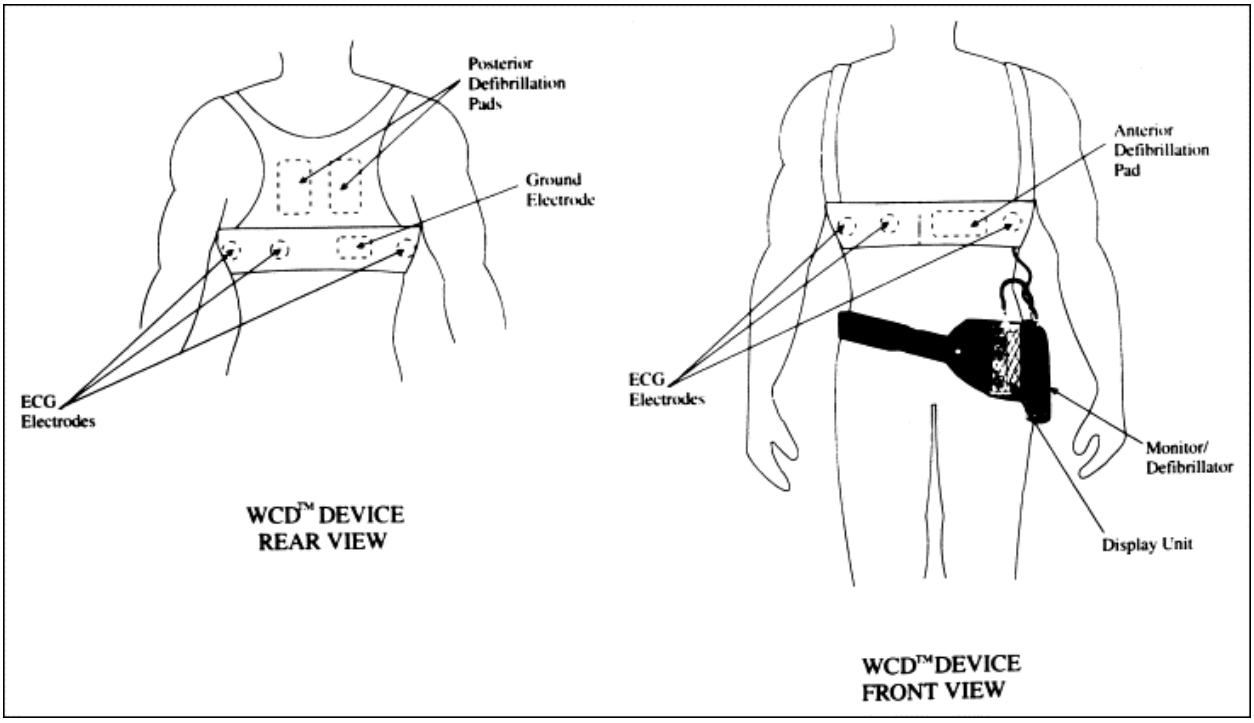

FIG-2 WEARABLE CARDIVERTER DEFIBRILLATOR

The LifeVestTM (ZOLL Lifecor Corp., Pittsburgh, PA, USA) is the only wearable cardiovascular defibrillator system accessible for patients in danger of SCD and was first approved by the FDA in 2002. The system comprises two fundamental parts which incorporate a garment and a monitor. The garment is worn under the patient's clothing and contains electrodes that assist with recording a sign for arrhythmia detection. The screen is normally worn around the abdomen or from shoulder straps and constantly screens the patient's rhythm. The garment contains a versatile belt and shoulder ties that convey four detecting cathodes and three defibrillator anodes. The defibrillator electrodes exude gel consequently not long before delivery of a shock. Microampere exchanging current is utilized to check electrode contact as in an ordinary conventional monitoring system. The screen contains the battery, defibrillator, an alert framework, and reaction buttons. The device likewise goes about as a loop recorder and persistently records and communicates information on tachyarrhythmias and

bradyarrhythmias. It does not have capacities for reinforcing bradycardia pacing or anti-tachycardia overdrive pacing. The device might be customized to various VT or VF zones with various reaction times (time from discovery to defibrillation arrangement enactment) and shock energy (somewhere in the range of 75 and 150 J, biphasic.[15]

ADVANTAGES OF WEARABLE CARDIOVERTER DEFIBRILLATOR:

The WCD provides non-stop ECG monitoring, wearing time facts, and event history interrogation via the internet. ECG analysis allows unique QT internal measurements, and identification of rhythm characteristics before an arrhythmic event, and yields beneficial records after spontaneous tachycardia termination or after shock delivery.[19]

ICDs are characterized by uncertain representation and omission of records to patients, with a notable loss of attention to psychological and long-term risks. Education of cardiologists on information alternate with patients might also sell knowledgeable choice-making and preempt threats to patient satisfaction of lifestyles.[16]

ICD use is related to a good-sized reduction in all-motive mortality in left ventricular assist device [LVAD] patients.[17] Exogenous electric and magnetic fields (EMFs) from resources, including excessive-voltage energy lines, substations, electronic article surveillance systems, or electric home equipment, induce noise signals in the human frame. They superimpose intrinsic heart signals and can cause electromagnetic interference (EMI) with energetic implantable scientific gadgets consisting of cardiac pacemakers or implantable cardioverter-defibrillators (ICDs).[18]

The WCD represents a secure and effective technique for patients acknowledged to be at excessive hazard of sudden arrhythmic death, but do now not fulfill usual standards for instant ICD implantation.[19]

QoL was obvious amongst ICD patients who shave experienced numerous tool discharges. The clinical staff of workers needs to be especially aware of the psychological and physical consequences for those patients. [20].

PHYSIOLOGICAL EFFECTS OF ICD:

- Anxiety
- Depression
- Health-related quality of life
- Post-traumatic stress disorder
- Psychiatric disorder

CONCLUSION:

Medical practice suggests that ICD shocks damage patients' QoL and account for the improvement of anxiety and despair issues.[21] As the population ages the wide variety of elderly patients considered for ICD implantation is decidedly increasing. But, information helping the clinical effectiveness of ICD in this age stratum is ambiguous and occasionally contradictory. [22] Younger age at the time of implantation changed into a predictor of higher prognosis inside the ICD-alone group.[23]

The S-ICD become permitted for primary and secondary prevention of sudden cardiac loss of life amongst individuals meeting traditional ICD implantation criteria however who do no longer have (1) an indication for everlasting pacing, (2) recurrent ventricular tachycardia treated with anti-tachycardia pacing, or (3) preexisting uni-polar pacemaker leads.[24] The implantable cardioverter defibrillator (ICD) is a type of life-prolonging treatment that could pose tough dilemmas in the ultimate phase of life.[25].

It may be that at the same time as the incidence of ICD shocks is a marker of more advanced cardiac disease, which itself portends a negative diagnosis, the occurrence of shocks within the presence of a diseased substrate provides extra incremental risk that can be decreased by the avoidance of unnecessary shocks.[26]

People with an implantable cardioverter-defibrillator (ICD) are at an expanded chance for arrhythmic sudden cardiac arrest. Given the capability of those devices in supplying continuous cardiac monitoring and therapy, we sought to determine if patients with an ICD or cardiac resynchronization therapy-defibrillator dwelling in 3 metropolitan regions heavily impacted by COVID-19 skilled a growth in ICD shocks throughout the peak of COVID-19 experienced as compared with the same term in 2019.[27]

An increase in comorbidities became located among ICD patients but not among the ones treated with pacemakers.[28]

These shocks are normally due to double counting, overusing, ectopy, and supraventricular tachycardias, starting from sinus tachycardia to atrial fibrillation. [29]

ADVANTAGES AND DISADVANTAGES OF ICD:

ADVANTAGES	DISADVANTAGES
It is extravascular (preserves venous access)	Does not provide bradycardia pacing or anti-tachycardia pacing
Low risk of systemic infection	Lack of advanced diagnostics
Avoids risks associated with TV-lead extraction if required	Large Size (Twice that of current TV-ICD)
Less or no fluoroscopy	Shorter battery life of 5 -7 years

Cosmetic considerations	The need for pre-implantation ECG screening [10]
TV-ICD: Transvenous implantable cardioverter Defibrillator	

FIG: 2 Advantages and disadvantages of ICD

Patients without ICDs perceived much less benefit from ICDs and had much less choice support. Participants regarded conversations with providers as inadequate. Needed interventions include improving and validating strategies for informed choices about ICDs.[30]

Recent improvements in ICD lead design and manufacture will ultimately result in good functionality with reliable long-term performance.[3] At the same time as in the early S-ICD experience, an appropriate candidate had been exceptionally young and with much less superior coronary heart disease, the paradigm is rapidly shifting towards the use of the S-ICD in present-day ICD candidates.[8]. Extremely low-frequency daily-life electromagnetic fields do not disturb the sensing capabilities of ICDs.[18]

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