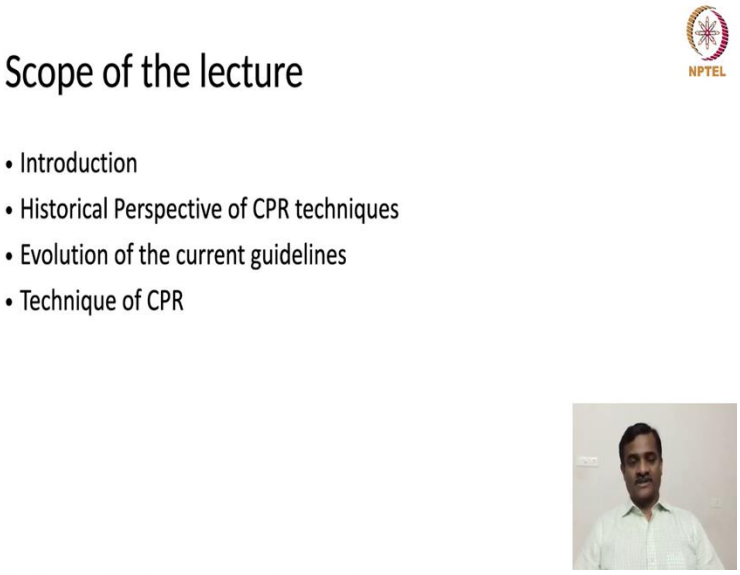
Management of Medical Emergencies in Dental Practice
Doctor Kannan Balaraman
Consultant Maxillofacial Surgeon
Ganga Hospital, Coimbatore
Lecture 1
Basic Life Support Part 1

Hello, everyone. Welcome to the presentation. Presentation is about basic life support. I am Khannan Balaraman. I am a Maxillofacial Surgeon from Coimbatore. I work in a hospital called Ganga Hospital.

(Refer Slide Time: 00:38)

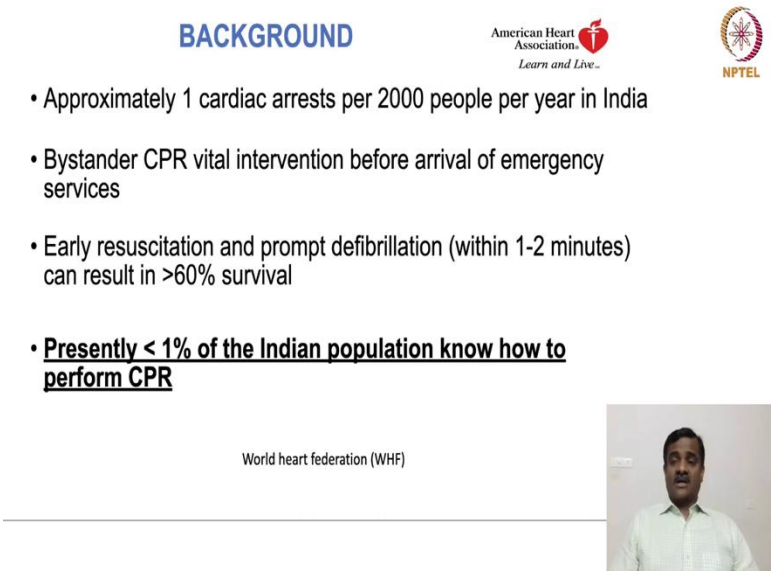


What is basic life support? As the name indicates basic life support is something which is quite basic which anyone and everyone can do. It does not need advanced techniques, it does not need a highly skilled medical personal to do. All it needs is a motivated person who knows the technique and who is willing to do the technique systematically so that it can help a victim or a collapsed illusion.

So this lecture, idea of this lecture is to introduce you to the basics of Basic Life Support. As you know, the part of basic life support, BLS is also a Cardiopulmonary Resuscitation or something what we call CPR. Cardio as you know is heart related, pulmonary as you know is lung related, resuscitation is revival.

So we will give you an idea of how the CPR techniques have evolved over time and also discuss about the current guidelines of CPR, how they have suddenly been altered, and finally the technique of cardiac pulmonary resuscitation with the note on AED Automated External Defibrillator which is also part of BLS in the recent decade.

(Refer Slide Time: 01:43)



Look at the background of this presentation or why CPR? In this context we have to acknowledge the immense contribution of American Heart Association who are at the forefront of formulating the guidelines of CPR, and also disseminating this knowledge free to almost everyone. However, the actual training of basic life support with the licensing of American Heart Association requires a charge because they have, they give you the study materials and they use this to research and disseminate the knowledge.

So if you want a certified program, a program of BLS which is certified by the American Heart Association by experienced people, then there is a charge involved. Otherwise the knowledge is, both the journals and the literature is available free of charge for everyone, not only clinicians. We are even looking at common public and download and read it.

The guidelines come in a journal called Circulation which is the endorsed journal of the American Heart Association. So if you look at the status of cardiopulmonary resuscitation

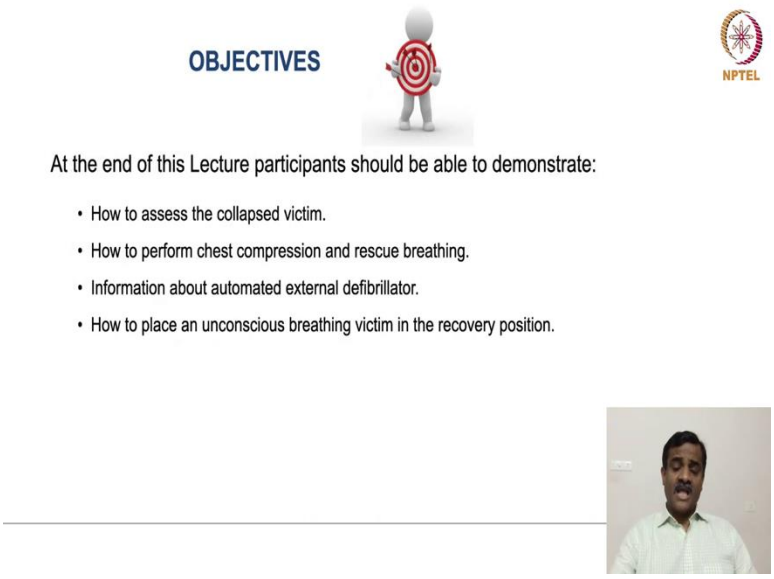
in India, it is, why it is important? Looking at the current demographics of India statistics say that every 2,000 people grew, may witness a cardiac arrest.

So what is cardiac arrest? Something like heart attack. So if somebody experiences heart attack, the heart stops and it does not function anymore. So at that time we need to give first aid and the type of first state is what we call basic life support, and part of the basic life support is CPR, cardiopulmonary resuscitation.

If a person who is next to the victim or next to the patient who has had, starts the CPR immediately, the chance of survival of that individual is quite high. You are looking at chance of survival if the CPR is initiated within the first minute or max within the second minute. However if there is a delay of initiation, the survival chances start decreasing and if it is more than 10 minutes, the chance of survival is almost negligible. And the quality of survival is not great.

Now, at least with the data presently only 1 percent of the Indian population know how to perform actual CPR that means less than a crore. Though a crore number is a huge number, if you look at the context of the Indian population, it is not that great. The World Heart Federation gives us this data whereas the technique of CPR, the principles of CPR is given by the American Heart Association.

(Refer Slide Time: 04:19)



So what is the basis of it? Imagine a an electric pump or any pump, a mechanical pump which is working 24 hours a day, 7 days a week, 365 days a year. There is no pump which has been designed by man which can continuously function, except a biological pump which is within man or any living being that is the human heart or the animal heart or whatever, which is part of the circulating system.

The role of the heart is to pump blood to all parts of the body. The heart, so it does two things one is pump blood to all parts of the body and then receive blood from there to all parts of your body. So basically it sends blood to the lungs, get it purified, and the oxygenated blood has to flow to all parts of the body, and then the used blood comes back to the heart, goes to the lungs. So this is a continuous process and it cannot stop.

If it stops, then the circulation stops. There lies the problem. Why the problem is the heart stops the brain is not going to receive any oxygenated blood. Brain is quite finicky. A human brain without oxygen or glucose for more than four minutes can go into irreversible damage and that is a problem. And that is why you want to do immediate first aid and take them to the hospital.

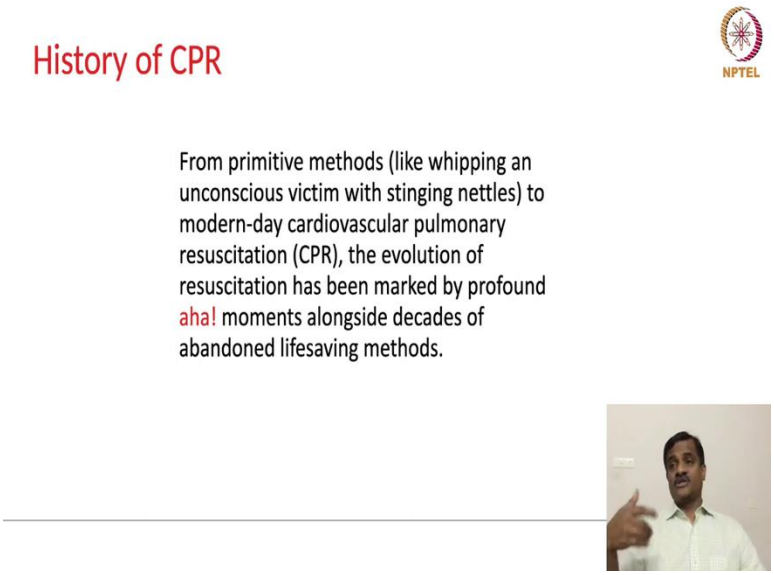
Taking them to the hospital is going to be a while, so if you start doing first aid to minimize this brain hypoxia and hypovolemia, as we say. So the aim of the lecture is to look at what to do when we have a collapsed victim, how to perform the actual technique of chest compression and rescue breathing, which is part of CPR. Chest compression, cardiac associated, rescue breathing, respiratory associated.

We will also discuss about the AED device which is nothing but the automatic external defibrillator. How it is incorporated into BLS in the last decade, and how it has helped in the survival rates. And then last but not the least, we will look at how to position an alive patient but who is unconscious, what we call recovery position so that he does not end up harming himself by aspirational choking.

We will also look at how to assess and manage a patient who is going to choke in our dental clinic. Remember this is part of the lecture series which is looking at Medical Emergency Management in a Dental Clinic, and this is how to exactly manage the emergency. The

previous one should have looked at medical situations here. At the end of any medical situation if there is a patient who is not responding to you, then we go into basic life support, and start CPR.

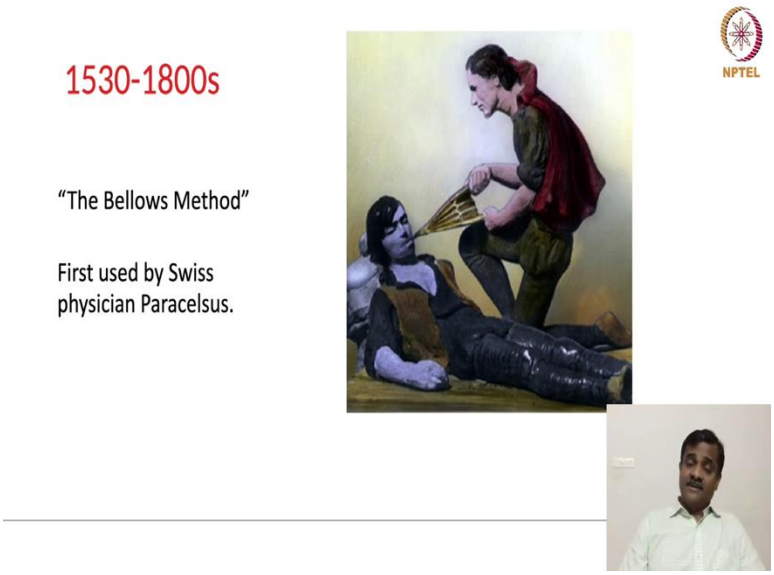
(Refer Slide Time: 07:00)



If you look at CPR per se, CPR or cardiopulmonary resource station what we call, though it was not called like that in the previous day, has been attempted by medical people from time immemorial. The commonest one is whipping the victim, whipping the victim with stinging nettles, so that thorns, so that it stimulates an unconscious patient.

So somebody who is hypoxic, hypovolemic or who is unconscious may be stimulated, but not a dead patient. But deadline, the understanding of physiology was not great, but all they could do is anybody unconscious, not responsive, they could try and stimulate. The only way they thought was pain, pain, pain as you will know is a very powerful stimulant, but not with somebody who is dull, who is not, who is hypoxic.

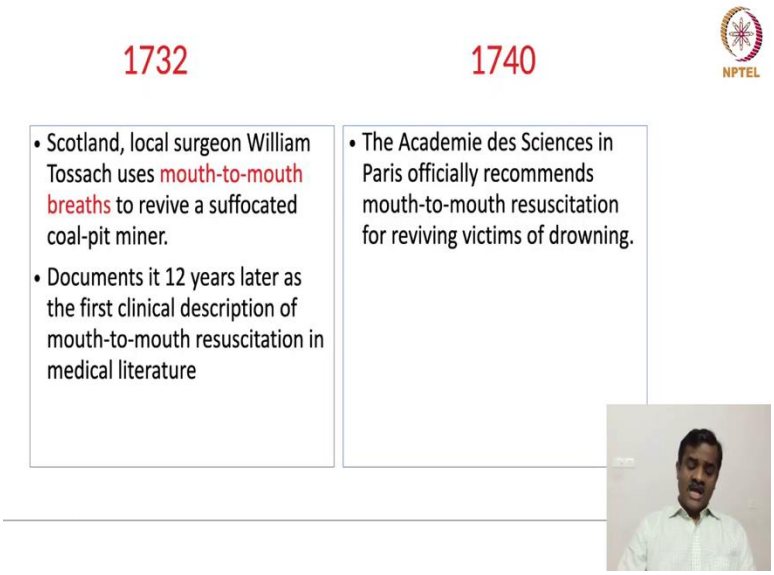
(Refer Slide Time: 07:47)



Over the millennium as time evolved, from the development of Renaissance Period and the in Industrial Age, when Europe became industrialized we had bellows blowing air into the furnace, so as to melt iron, which could be done as a cottage household industry.

So when bellows came, people understood that you could pull air from the atmosphere and push it into a particular area, and they used that to push it into individuals. This when they realize an individual is not breathing, air is not going in and out and they attempted to push it. Though it has been recorded over a few hundred years, the actual description is by the Swiss Clinic, Swiss medical man, Paracelsus who had first explained this.

(Refer Slide Time: 08:35)



As we go on towards the 17th century, 18th century, bellows was that is it, remember when you are using bellows, you are only looking at the respiratory aspect. We have not discussed the cardiac aspect of resuscitation, because the understanding of heart physiology was not great at that time.

So as the industrial revolution progressed, remember it involved a lot of mining, Scotland was a place for a lot of coal mines. And at the depth of the coal mines, people used to feel suffocated with the fumes coming in as they were digging for coal. They could get choked and they would die or they could be asphyxiated.

So part, as part of saving these trapped coal miners, the local surgeons attempted mouth-to-mouth resuscitation as described by William Tossach. At the same time even if you look at the French literature, France was comparatively as good as, one French literature also described mouth-to-mouth resuscitation for drowning patients. So both are addressing only the respiratory issues, we have not looked at the cardiac issues yet.

(Refer Slide Time: 09:41)

However the first evidence of cardiac issue was described by a Danish veterinarian in chicks. So though the full physiology of heart was not understood by us, let alone animal physiology, animal physiology was much more understood than the human physiology, obviously for the difficulties of dissection and getting and understanding them.

So with the chick, he tried stimulating the chicken, he could elicit a beat, just a single beat. So, and that was reported in literature. So that gives us some evidence that there is some other activity apart from just the breathing alone. So a lifeless chick was shocked and then they could elicit some beat, so that they felt is, it is not breathing, something else is happening and then they understood it could be the heart.

(Refer Slide Time: 10:27)

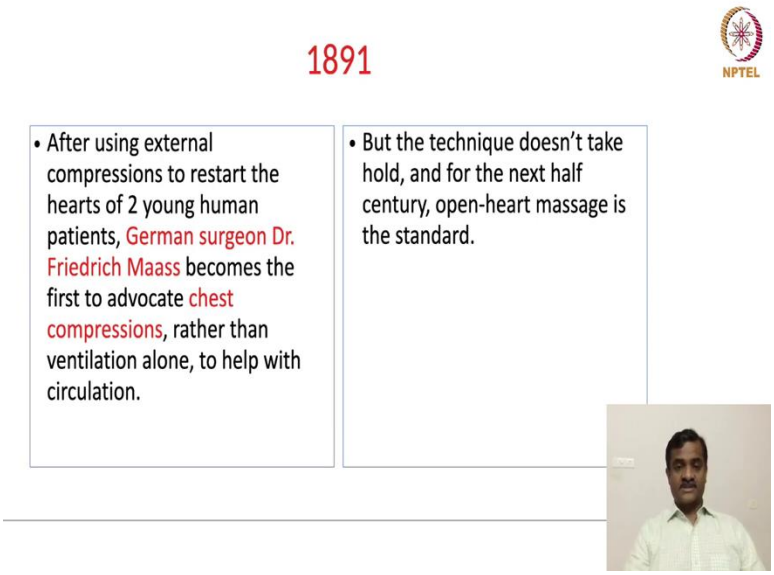
However, with the late 18th century, until the 20th century there was not much clear idea of the circulatory physiology or how to address it. So patient positioning was considered important. An unconscious patient, remember when choked on himself, the idea was to make sure that he does not choke and he continues to breathe, whatever you are using.

So while the Hall method involved positioning them laterally, though it was quite awkward, and you could see that positioning them on an, on a mass of sheets of bed so that the head tilts down, so the saliva flows down. The moment when somebody is lying back, the tongue falls back, saliva goes back and they choke in an unconscious patient.

Another method was chest-pressure arm-lift method. They thought that increasing the chest pressure will help in an unconscious patient. They could not understand how to increase the pressure. Only thing they did was raise the arm, so that the chest expanded for them. So these were the two things which were advocated, and these were difficult scenarios.

And if the clinician, if the medicine man was called to the area or he witnessed the arrest, he tried it. But when he went there, the arrest was already happened the patient was not responsive and they were cold and uncommunicated, then he was left and declared dead.

(Refer Slide Time: 11:43)

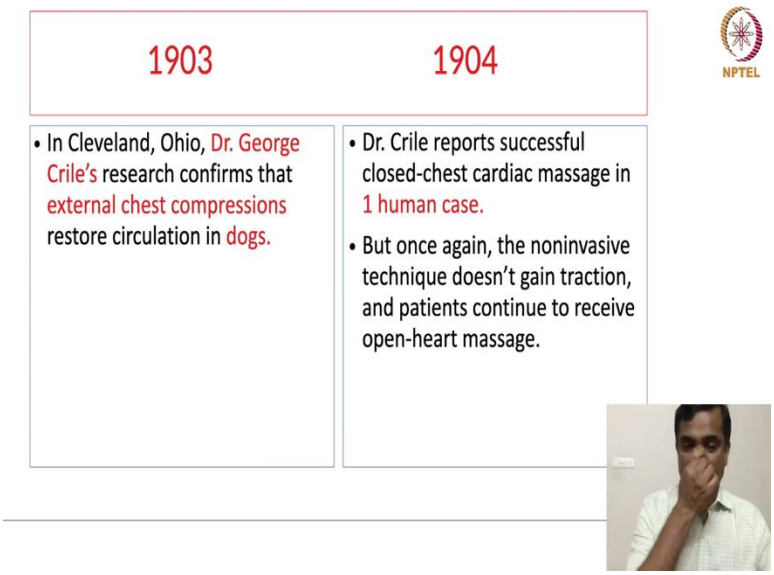


In the late 19th century, it was a German surgeon Dr. Frederich Maass, who came up with the concept of chest compression rather than ventilation alone, to help with the resuscitation. The external compression was what he described. Though the description was okay, it did not take much traction. At that time people, some people, though they understood the concept of compression and circulation, it was direct open heart massage.

That might mean cutting open the chest, doing a sternotomy, and compressing the heart with the fingers, so that was quite drastic. As you will know, in an already collapsed patient, you cut open the chest, he is going to bleed even more, and you are stimulating the heart is not going to respond even more. The chance of success was less, but remember, these were already dying patients.

The concept of external massage did not take traction, difficult to specify a reason why other than the fact that we could tell that people did not understand the concept. Now why is the circulation coming?

(Refer Slide Time: 12:46)

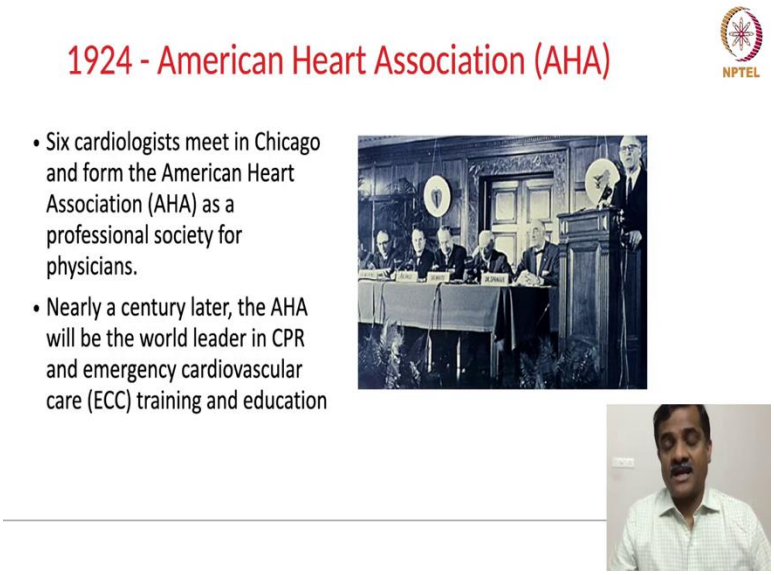


So the, but at least the evidenced that heart has to be stimulated to squeeze the blood to other parts of the body. In the beginning of 20th century, from the Americas, American medical team started progressing much more. George Crile, this is a name which will resonate very much amongst maxillofacial surgeons, especially interested in cancer care, or any oncosurgeon.

He was a prolific surgeon with specific interest in cancer, head and neck cancer, there are incisions in his name. So head and neck cancer, remember, could lead to choking and aspiration and a lot of deaths, and it was quite fungating death, and so Crile was associated with resuscitating them.

As part of his research, he realized that external compressions were effective and he demonstrated that in dogs. External compression of the heart was effective. He also tried proving that in humans. Though he was successful in one case, he did not get much traction because it was not quite popular or the physiology was not as clear-cut. Still, open massage was an option for all the people to follow.

(Refer Slide Time: 13:49)



The current concept of cardiopulmonary resuscitation on the techniques and principles of resuscitation owes its moorings to the establishment of American Heart Association. It was formed in Chicago in 1924. We are almost close to 100 years there. It started as a professional society for interaction amongst cardiologists to discuss their cases, discuss concepts and propagate knowledge.

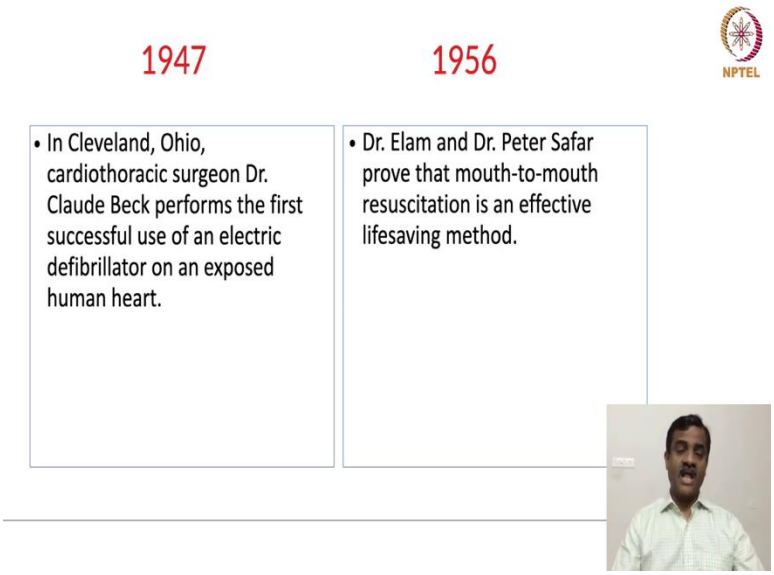
So nearly, we are nearly a century there, and I think it is the guidelines of American Heart Association which has been a trendsetter for CPR training, and also basic life support and advanced life support principles. The American Heart Association takes pride in evaluating them and trying to address these issues constantly. So they lay emphasis on training, education and dissemination of the knowledge.

All the knowledge, all the research is published in a journal which is affiliated to the American Heart Association. The journal called Circulation, and the, all the literature pertaining to CPR and basic life support is free for everybody to download and read, not only medical people, but also common man. So that is the service of American Heart Association.

American Heart Association lays out principles for free, however if you want a certified training, meaning a training in BLS or ACLS, certified by AHA, where they give a

certificate saying AHA, he has done an AHA accredited course, then it needs to be, it carries a fee. They give you a lot of study materials to support that as well.

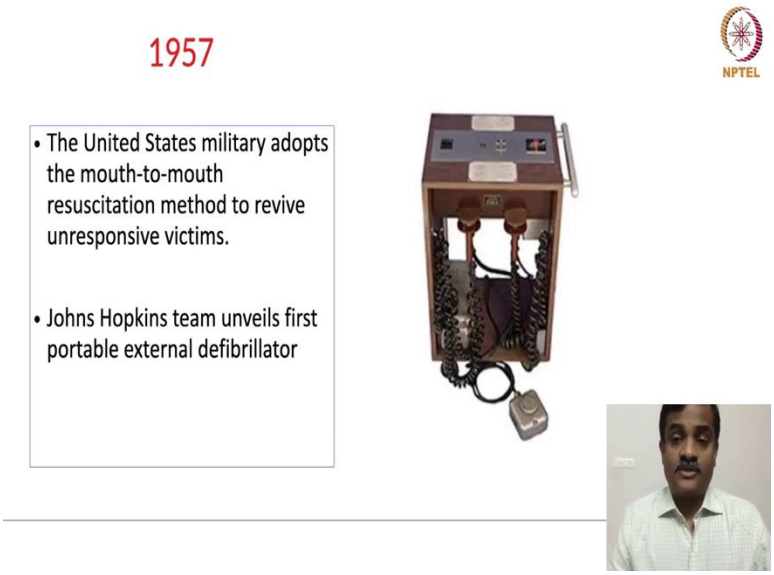
(Refer Slide Time: 15:31)



As external, and then as the AHA understood the concept of physiology, they propagated that external cardiac massage also, like compressions of the heart. As we came close to the second world war, and after the second world wars, medical fields started evolving greatly and in Cleveland, Ohio, Dr. Claude Beck demonstrated the first successful use of a defibrillator on an exposed human heart.

Still, remember, a lot of open heart surgery and manipulation was still going on. And the concept of, current concept of appropriate mouth-to-mouth resuscitation, not the bellows, not blowing, current concept of how to position mouth-to-mouth and how to breathe into the victim's mouth, the basic principles of it was established by Dr. Elam and Peter Safar, and they proved to everyone that how effective this method is, if done properly and appropriately.

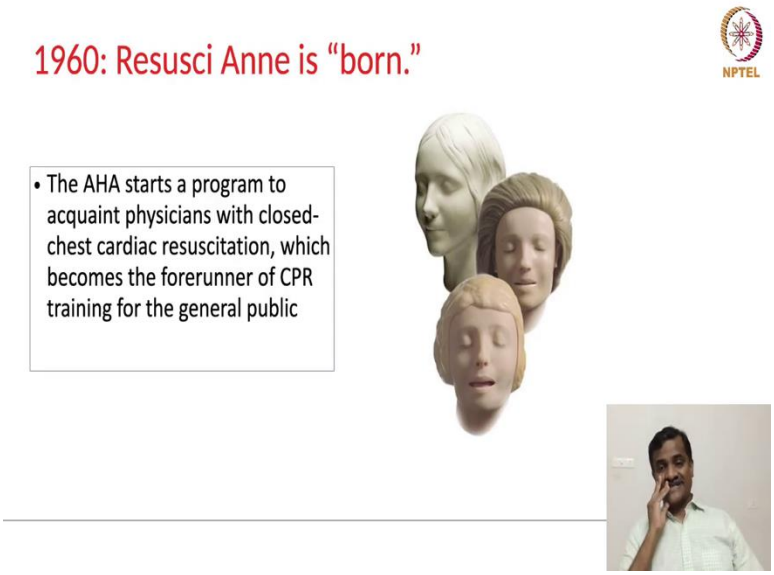
(Refer Slide Time: 16:34)



The United States military, the United States, as you know, started becoming the premium, a world power at that time and they took pride in disseminating, not only medical care and also medical care to all their troops all over the world. Remember, American troops traveled all over the world. So they had to send devices all over the world, and this needed to use the external defibrillator. A portable one was also designed by the John Hopkins team.

The U.S. military adopted guidelines for mouth-to-mouth resuscitation as well. So once they adopted the guidelines, the trainings disseminated to everyone. And whoever American military interacted with, they were also taught about these techniques. And then these techniques started taking root and spreading all over the world.

(Refer Slide Time: 17:25)

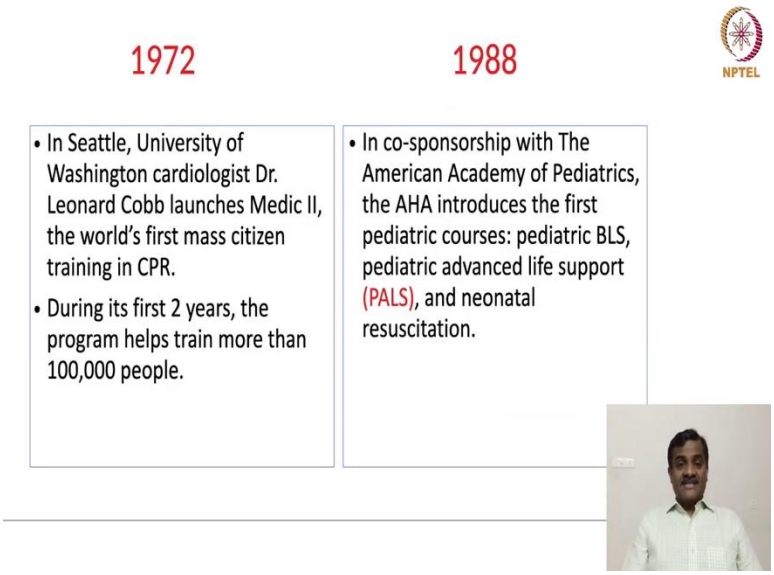


In the sixties, we hear of the famous story of Resusci Anne, wherein a common man, an engineer, who, whose daughter was unwell, when he took her to the causality in his, in a state in the U.S, he found that the people were not quite trained in doing, and there was a lot of confusion and pandemonium in trying to resuscitate her.

So when he spoke to the clinicians, he found that setting up established protocols helped, but the problem is reading them alone and trying to practice them is very difficult. So you need to have practical sessions to improve your skills. BLS and CPR techniques are something akin do techniques like riding a bike, swimming or driving a car, which emphasizes that trying to practice them or trying to do things practically helps with the technique. Only reading does not help.

And once he understood, he designed a mannequin on which people could practice and the mannequin was named Resusci Anne and is in memoriam of his daughter who passed away, unsuccessfully. So therein lies a man who took umbrella the way things were and it decided to turn or help the system there, and hence Resuci Anne was born.

(Refer Slide Time: 18:51)



So it was in the seventies in Seattle, again the Americans led the way, how to start propagating the knowledge of CPR, and they started incorporating the training for common public as well. They understood the importance of early resuscitation and people and they started training people, trying to make the language simple, in a simple ways so as to disseminate the knowledge.

So their goal was to spread it to as much people as possible and they kind of succeeded in their goal. If you look at the numbers, over the first two years it was more than 100,000 people or 1 lakh as we call it here, did. So as an offshoot of the Cardiac Life Support program, Pediatrics Department, as you know, they take pride in applying principles of care and protocols and pathways of training for pediatric patients.

They adopted the BLS to the pediatric population, what they call Pediatric BLS, and the other became Pediatric Advanced Life Support or commonly called the PALS, and an offshoot of that was neonatal, newborn resuscitation as well, when a newborn does not respond well. So we can see how the essence of CPR and basic life support has evolved over the years.

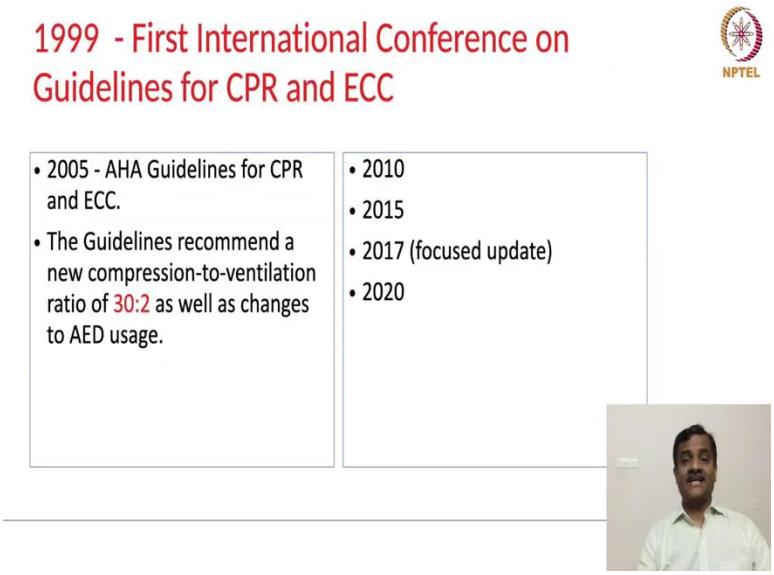
(Refer Slide Time: 20:14)

In the 1990s, external defibrillation concept had come, and it started gaining traction and how it could be disseminated into public space was there. Now there are AED machines all over in public place. In our country, it is gaining traction. And remember, in our country all 5-star hotels, all airports and all public spaces should have an AED machine. Or they are trying to come, the government is trying to push it. NGOs are trying to push it.

For example in our city, Coimbatore, the hospital, our hospital, Ganga Hospital, Rotary Club of Coimbatore, it is the oldest club in the city, and the companies, and private partnerships with companies like Philips have come together to establish and set up AEDs in almost 13 to 15 places in the city, in public places like bus stand or railway station. There are three different bus stands and everywhere two railway stations everywhere, and even in the jail.

So not only leaving this physical infrastructure there, but also training the public, training the core people there into the usage of AED. Otherwise it just becomes a box. AED, again to reassure, is Automated External Defibrillator.

(Refer Slide Time: 21:32)

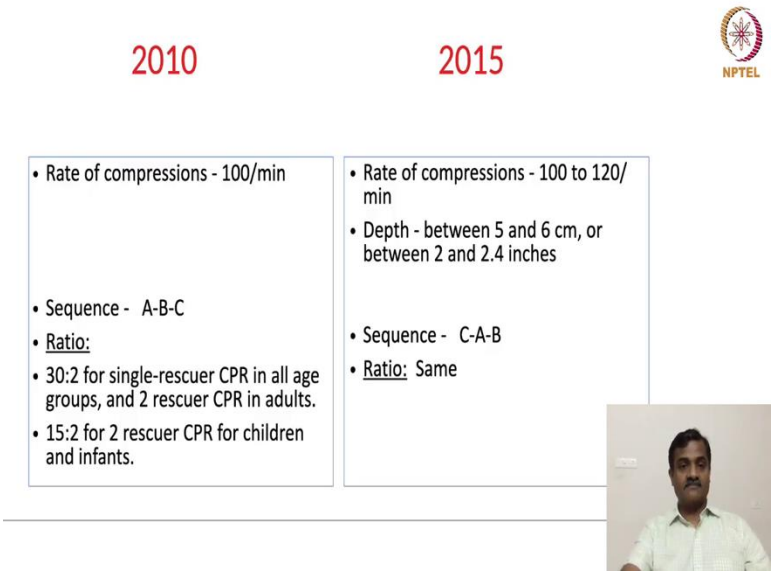


So from then on guidelines were incorporated for appropriate CPR. Remember, it is come to the public domain and we have got not only physical technique of external compression and mouth-to-mouth breathing, an added component of a shock machine has been given. We will understand and discuss about the shock machine as we come to that concept.

So from 2005, 1999 it started, in 2005, we had the guidelines, and then the current guidelines every five, five years the guidelines undergo a thorough revision, every two to three years they undergo an update. So the guidelines which we follow now are 2020. Initially, when it started in 2005 or '99 and 2005 as it evolved in this century, it incorporated A-B-C, Airway-Breathing-Circulation.

And when you approach a patient, this was what done you approach. Look at the airway of the patient, look at his breathing and then look at the circulation. Now, there is a subtle change. The concepts of how many compressions to how many breathing to give was done, that is 30 is to 2. All that came about with this guidelines. And these guidelines were universally applied all over the world. Not only in one country, all over the world. Feedback was sought by them, discussed again and then evaluated periodically.

(Refer Slide Time: 22:54)



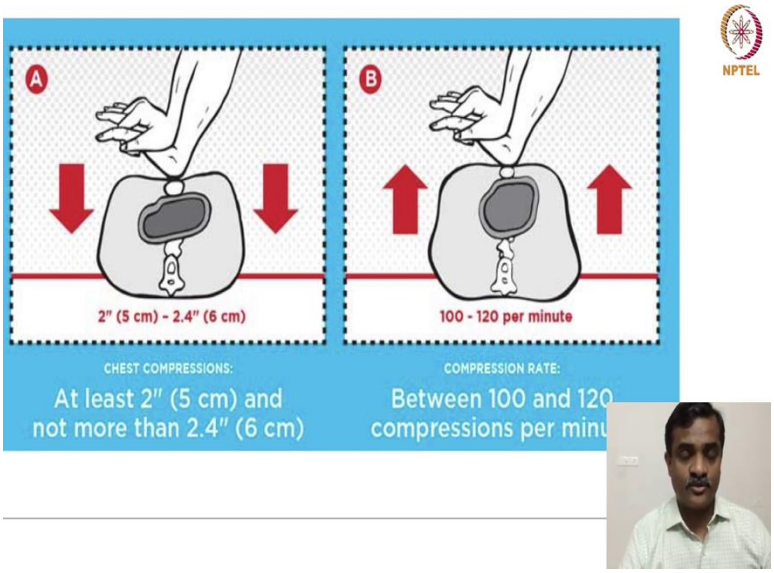
in 2010, again the sequence was A-B-C, and then the concept of 30 compressions to 2 for a single rescuer or 2 rescuer in adults changed. If, whereas in kids it became 15 is to 2. In 2015, the compressions, wanted to concentrate more on the compression. So in from, just from 100 a minute they said you could go more than 100, 100 to 120. Whereas the guideline initially was 4.5 to 5 centimeter became 5 to 6 centimeters.

And from 2015 onwards, the sequence changed from circulation airway and breathing. So from A-B-C, it became circulation, airway and breathing, meaning compression started getting more attention. Why did it come about? Initially, it was airway, breathing circulation, A-B-C. It was a nice mnemonic, everybody could see, you approach a victim, see if he's breathing, if his airway is intact, like, see if there's blood in the mouth or something, you clean it, look at his breathing, if he is breathing, and then look at the circulation, like pulse and then start compression.

Whereas now, in an adult, we know, the, why an adult collapses or becomes unresponsive, because it is heart attack. Whereas in kids, it is mostly airway. In a drowning patient, we do not need to do this but in a patient who is not drowned in water, if you see him outside, most likely it is cardiac arrest for an adult. And that is why it has become C-A-B. It is a subtle shift and we will see how it goes.

The ratio of 30 is to 20, meaning 30 chest compressions to 2 breaths is the same for adults whether single or many people who can do CPR are present, whereas in kids if there is a single person, you do 30 compressions to 2 rescue breaths, if there are two, it can come down to 15 is to 2 because breathing is more important for kids.

(Refer Slide Time: 24:43)



The chest compression has to be at least 2 centimeters, what we are meaning by chest compression is we are externally compressing the chest. When you compress the chest, the ribcage goes inside. When it goes inside, the heart is within the cage, it gets compressed. When it gets compressed, whatever blood is within the heart flows out to everywhere. Then you relax as in the b, picture b.

So whatever blood is in the veins get filled into the heart again. Then you compress again. So you do that. You do it in such a speed that it is 100, 120 per minute. So meaning every second you are hitting 2, and you count out loud. So you do not take your hands off the chest, the hands are in continue with the chest, and you press with the heel of the hand. The actual technique we will see, again, later.

(Refer Slide Time: 25:30)

So whether you are in-house hospital healthcare provider or out of hospital, other healthcare provider, an independent healthcare provider, the principal is the same. If you see them in the hospital, you recognize them, you have to alert the emergency medical system before you perform CPR. If you see somebody collapsed, do not jump to CPR because you might not get any help.

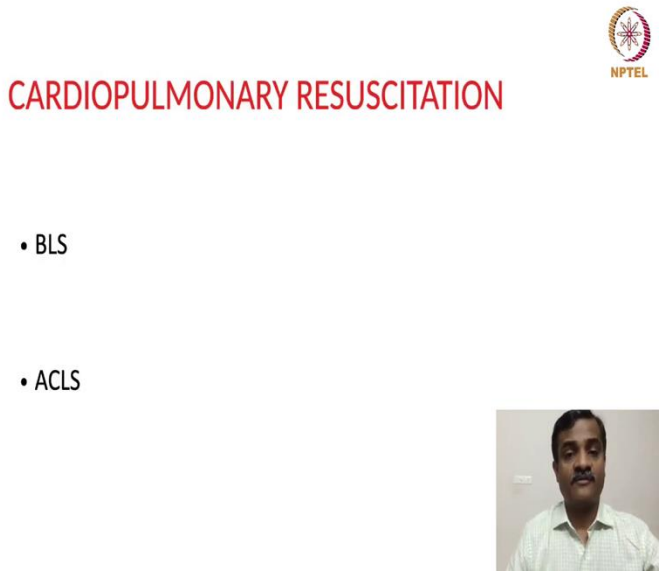
You have to get some help. If there is no help around, you go and make a call as to who is going to come. If you are out, within the hospital there is an emergency medical team, and there is training for the emergency medical team to reach the area of problem. If there is a war in one corner of the hospital, if the command is activated, the emergency medical team reaches there, and to perform CPR.

We do not want to wait to take the patient to the critical carrier. Similarly, in the outside world, the same thing is followed. You call an ambulance and an ambulance comes. As the emergency medical team comes or the ambulance comes, we start doing CPR for them so that we can keep compressing.

So we are compressing the heart, giving the breaths, like the 30 is to 2, but the speed of it is like it is 100 per minute, till the medical team comes and takes over or the ambulance comes and takes over. And then they go to the hospital and they get appropriate care. They

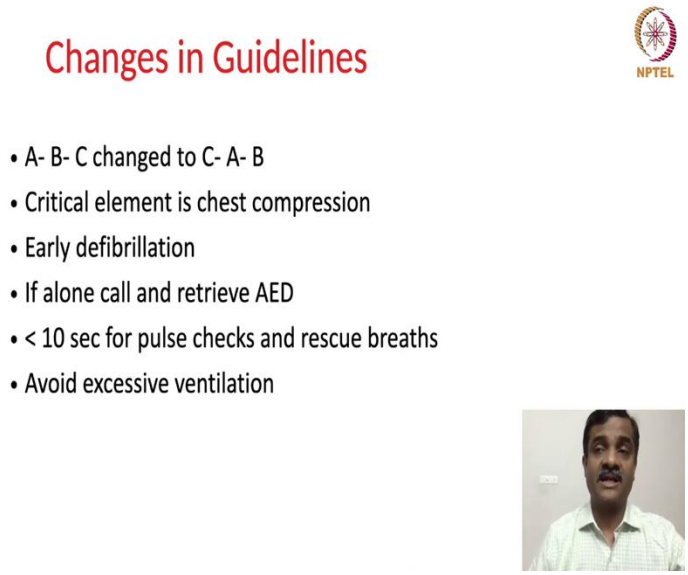
can revive the heart, well and good, and they survive. In the current day and age it is mandatory to know the techniques of appropriate CPR and then do the techniques so that we do not mess up the patient.

(Refer Slide Time: 27:02)



There are two components of cardiopulmonary resuscitation. One is called BLS, which is basic life support and the other one is ACLS, advanced cardiac life support. As basic healthcare providers, it is imperative that we know what BLS is and the technique of BLS. ACLS requires specific training and certification as well, and that is essential for people who like anesthetist, cardiologist or surgeons who are in critical care work, or anybody can take it, even if you are interested. But it is mandatory for us to take basic life support.

(Refer Slide Time: 27:32)



As we saw the change in the current guidelines from airway-breathing-circulation to circulation-airway-breathing, because compression is the first component nowadays, especially for adults. And give defibrillation, the shock machine as much as possible. If you are the only person, go make the calls for the ambulance if it is outside or the emergency system in the hospital before you come and initiate CPR. Do your checks of pulse and breathing, and start the process.