**Management of Medical Emergencies in Dental Practice**
**Professor Santosh Rao**
**All India Institute of Medical Sciences, Raipur**
**Lecture 18**
**Allergies/Hypersensitivity Reaction Part 1**

(Refer Slide Time: 0:16)



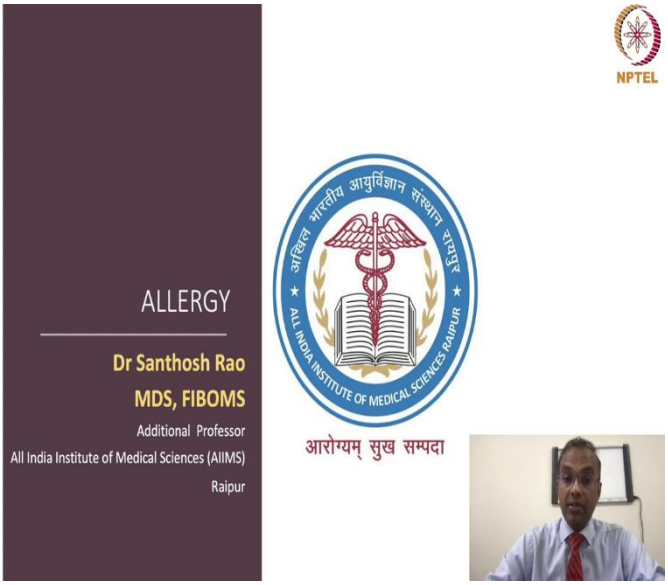
Hi, hope you are all having a good day. So, you all know what is an emergency, you heard of it. So, what exactly is? in emergencies anything which emerges with an urgency, it can be anything, it comes out with an urgency, it is called as an emergency. So, are we, how to handle it? We have to be prepared, only when we are prepared for an emergency and emergency normally cease to exist because as I said it is emerging with an urgency and when you anticipate the urgency, it is not an urgency, you know, it is going to happen and we know how to handle it.

(Refer Slide Time: 0:56)


So, that is why it is very important to know the three hallmarks of any sort of any emergency for that matter that which we come across in our routine dental or medical practice. It is prevention, preparation, and the management. Prevention, how to prevent an emergency? because by just by preventing an emergency, we can save a lot of lives, a lot of Cath strophe, lot of uneasiness in the practice, and once you know, when to anticipate an emergency, are you prepared to manage it? Preventing is not alone, sometimes it happens.

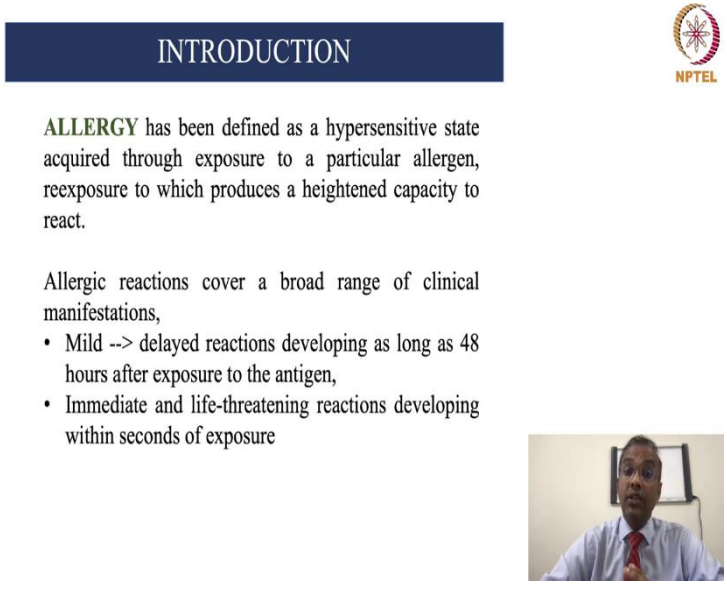
When it happens, are you prepared? Prepared, it does not mean that you have all the armamentarium at your clinic or at your desk. Are you knowledgeable enough? Even having a knowledge of identification, and knowledge of management of an emergency also comes into the preparation of that. Once you are prepared for the management or identification of emergency, then comes the management effort, that is adequately managing the patients, that requires both your clinical skills, and your armamentarium to be at your disposal to maintain an emergency.

(Refer Slide Time: 02:07)




Now, today one among those emergencies is called allergy, which I am going to talk about. I am Doctor Santosh, I am an additional professor in All India Institute of medical sciences, Raipur. I am a polar maxillofacial surgeon by profession.

(Refer Slide Time: 02:20)

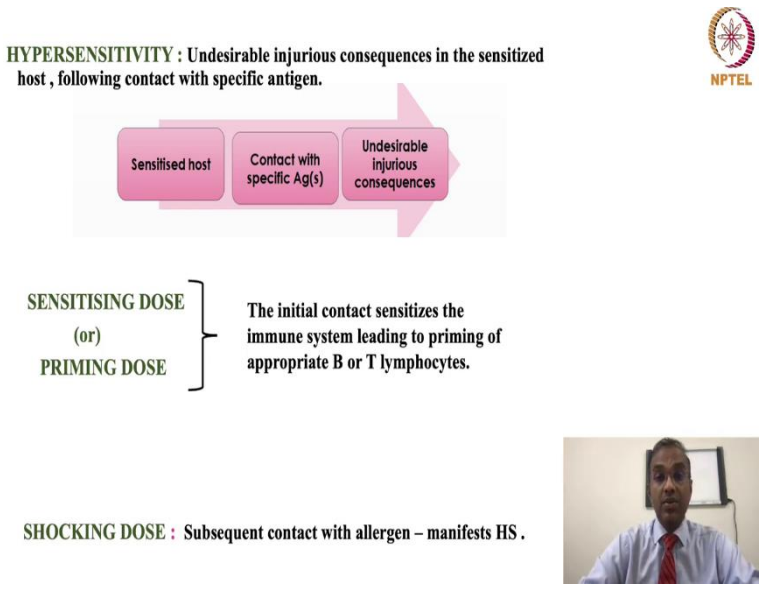



What is an allergy? It is all, we all say, we have somebody who is got a food allergy, somebody has got a cat allergy, somebody has got hay allergy, dust allergy, for that matter energy is in general it is in hypersensitivity state. It is usually occupied through an exposure to a particular known allergen. Noted again, exposure to a particular allergen with re-exposure to the same allergen, produces a heightened capacity to react.

I want you to ponder about here again, exposure to a particular allergen and with a re-exposure there is a heightened capacity to react. Why I am stopping here for a moment and reading the definition for you very clearly, is again its allergy is not always caused by the first exposure, it is always, it is a re-exposure which leads to a hidden capacity…

So, this hypersensitive state can be a mild, which can just have a couple of other rhinitis, or a small itchiness, or some sort of an erythema on the skin, and goes away for a short duration of time, a couple of minutes or maximum to 48 hours or it can be an immediate life-threatening reaction which can lead to a catastrophe and even death of the patient, so you have to be aware of both sort of an sequelae of energy for that matter.

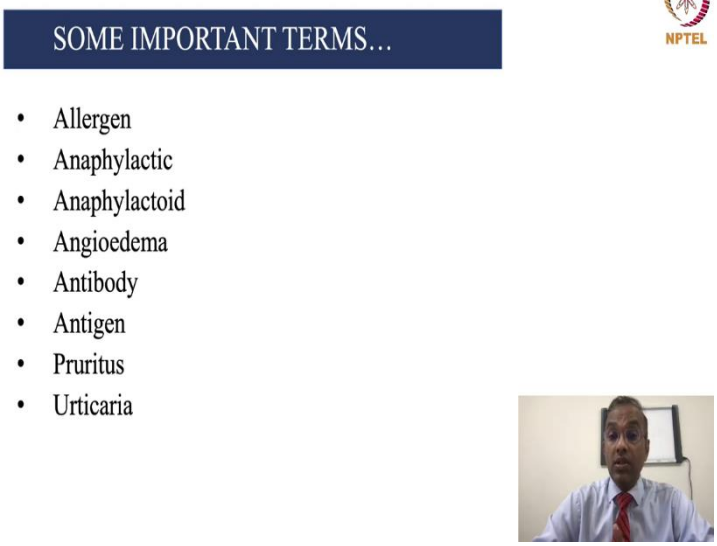
(Refer Slide Time: 03:53)




How is it? As I mentioned, it always needs to have a sensitization, that is once a sense that is called as a priming dose, it is a sensitising dose. That, what happens with that is, with the contact with the allergen, that is your antigen, there will be a sensitization of the immune system of the body. The immune system of the body is might be your neutrophils, or your basophils and for that the priming needs to happen at the lymphocytic level. The main appropriate cells the B and the T lymphocytes which gets primed up and they are ready to take up on any other subsequent injury by the allergen.

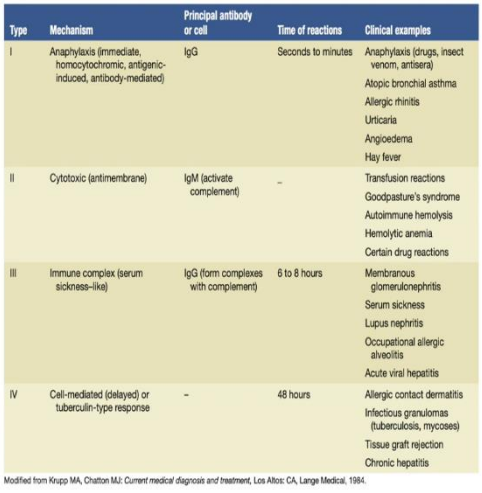
At that point of time when there is a shocking dose, that is your secondary dose, and that is called a subsequent dose. When the subsequent dose of the same allergen which is already being sensitized by the lymphocytic mechanism of the body is exposed to the person that manifests into an acute or a full-blown allergic hypersensitivity reaction.

(Refer Slide Time: 05:04)




So, I hope you all are clear on this part we have got, a sensitising dose and a shocking dose. Now, other important terms which will come across in this is Allergen, Anaphylactic, Anaphylactoid, Angioedema, Antibody, Antigen, Pruritis, Urticaria. These are different terminologies which we come across when you read about allergy. What is an allergen? It is anything which is not innate in the body which is supplied or which is ingested into the body or it enters the body system which can elicit an immunological response to the T and P lymphocytes, it is called as an allergen. Anaphylactic means without protection. Ana means no, protection phylactic is protection, the body is unprotected for this sort of an analogy and can lead to anaphylactic reactions.

(Refer Slide Time: 05:56)



| Type | Mechanism | Principal antibody or cell | Time of reactions | Clinical examples |
|---|---|---|---|---|
| I | Anaphylaxis (immediate, homocytochromic, antigenic-induced, antibody-mediated) | IgG | Seconds to minutes | Anaphylaxis (drugs, insect venom, antisera)<br>Atopic bronchial asthma<br>Allergic rhinitis<br>Urticaria<br>Angioedema<br>Hay fever |
| II | Cytotoxic (antimembrane) | IgM (activate complement) | – | Transfusion reactions<br>Goodpasture's syndrome<br>Autoimmune hemolysis<br>Hemolytic anemia<br>Certain drug reactions |
| III | Immune complex (serum sickness–like) | IgG (form complexes with complement) | 6 to 8 hours | Membranous glomerulonephritis<br>Serum sickness<br>Lupus nephritis<br>Occupational allergic alveolitis<br>Acute viral hepatitis |
| IV | Cell-mediated (delayed) or tuberculin-type response | – | 48 hours | Allergic contact dermatitis<br>Infectious granulomas (tuberculosis, mycoses)<br>Tissue graft rejection<br>Chronic hepatitis |

Modified from Krupp MA, Chatton MJ: *Current medical diagnosis and treatment*, Los Altos: CA, Lange Medical, 1984.

So, these hypersensitivities are basically of different types. Now, we all know about it, we have read about in our basic sciences classes. You have got type 1, type 2, type 3, and type 4, each type has got a different mechanism by which it works and what leads to clinically and we are as a clinician, I is supposed to know it, so that we can anticipate and we can address the same.

Type 1 is a classical one, it is called as anaphylaxis and it is usually immediately and it is it can, it is usually an antibody mediated. The principal antibody which mediating the mechanism for phylaxis is immunoglobulin G and usually it takes only a few seconds and minutes probably maximum 5 to 10 minutes, the reaction of anaphylaxis usually sets in. What leads to it anaphylaxis? It can be drug insect or any venom, it can literally bronchial asthma, allergic rhinitis, artic area, hay fever, these are the different clinical manifestations of a type 1 hypersensitivity reactions.

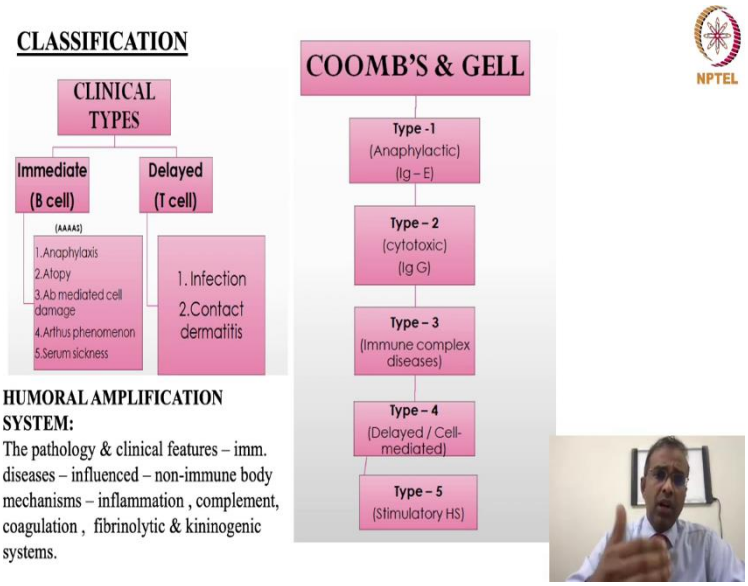
Type 2 is cytotoxic, that is anti-membrane, the cellular membrane, there is a response to the cellular membrane for the body, it is a cytotoxic cell itself becoming toxic for that matter. In this, usually having IgM, that is immunoglobulin immediate activation of the hypersensitive reaction. The good example for this is transfusion reactions, where in which new cells are introduced into the body by itself. Your blood transfusion, new RBC, nucleus, this in turn leads to a reaction, reactionary state of hypersensitivity, that is usually leads to cytotoxic reactions. It can be even haemolytic anaemia and very rarely certain drugs also can lead to a type 2 hypersensitivity reactions.

Now, coming to a type 3, type 3 is purely, it is an imminent immunological complex means it is more like a serum sequence level, where again it is normally caused due to an again immunoglobulin G, but it usually elicits at a slightly later site it does not take minutes it usually takes 6 to 8, 10 hours for the responses of a type 3 hypersensitivity to show up. It can be an occupational allergic hyaluronic is a hepatitis or hepatitis or a serum sickness and these are the different manifestations of immune immunologically mediated immune complex type 3 hyper centric reactions.

The last is a Cell-mediated means a cell by itself a certain cells or delayed response. It usually takes delayed normally around 48 hours or so. Like it is examples of a graph rejection like you do you do a transplant, heart transplants, or a kidney transplant, it does the body responds it with an hyper sensitive reaction, that is what you might have heard doctors saying, yeah, we did a kidney transfer, but the patient detects at the graph rejection, host versus graft rejection principles blocks of this. Even tuberculosis, like tuberculosis and myosin, mycosis and even a

chronic hepatitis are the examples of these type of cellular mediated delayed response of hypersensitivity.

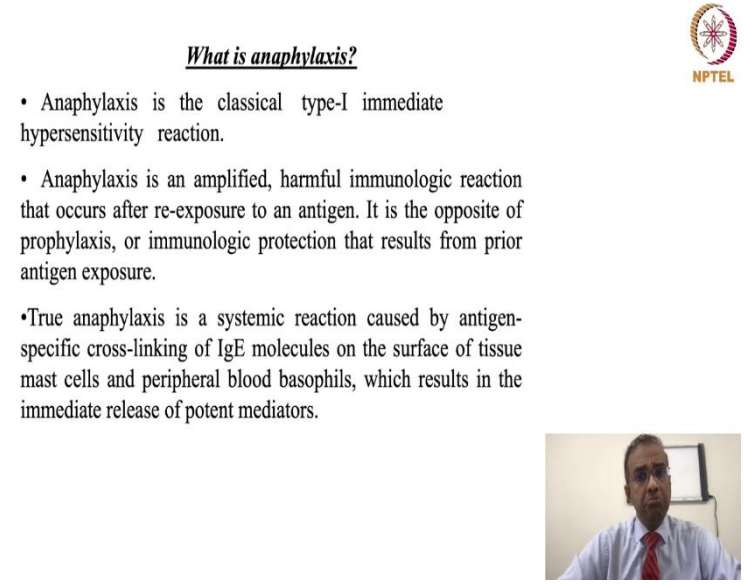
(Refer Slide Time: 09:12)




So, with this a different type of hypersensitivity, in question with all these types of fibre irrespective whether it is type 1, type 2, type 3, the response, the ultimate outcome has to be mediated with one among one of these lymphocytic cells. So, we have B cells and the T cells, so you can see the classification which says normally, these anaphylaxis, atopy, antibody, anti-antibody mediated cell damage serum sickness.

These are the things which normally mediated to a B cell response of a hypersensitivity. On the contrary a chronic infections like hepatitis and even the contact dermatitis is usually caused due to delayed T cell activation of that, and this is just a chart to depict the different type of hypersensitive reactions.

(Refer Slide Time: 10:04)




Now, sticking on to what is what we call as an emergency which we come across in our really in our practice is anaphylaxis. Anaphylaxis is a classical example, of a type 1 immediate hypersensitive reaction which can or can be in catastrophe, if it is not managed adequately or diagnosed adequately in time. So, that is the reason why here I expect everybody of you to be a little bit cautious and understand the principles of anaphylaxis and the pathophysiology of anaphylaxis, how to anticipate it, how to elicit, and how to manage anaphylaxis in your practice, so that you can save some lives in your life, definitely.

Now, as I mentioned anaphylaxis is an amplified, harmful, immunological reaction that occurs after re-exposure to antigen, watch this word again re-exposure, it does not happen always with the first exposure re-exposure, and it is opposite of a prophylaxis. What happens in a prophylaxis? We have taken prophylaxis; I am sure everybody have taken prophylaxis for your Covid vaccinations. Now, we take a first dose, we take a booter dose, we take a tertiary dose like in hepatitis. What happens is with an addition of doses? The immunological protection increases.

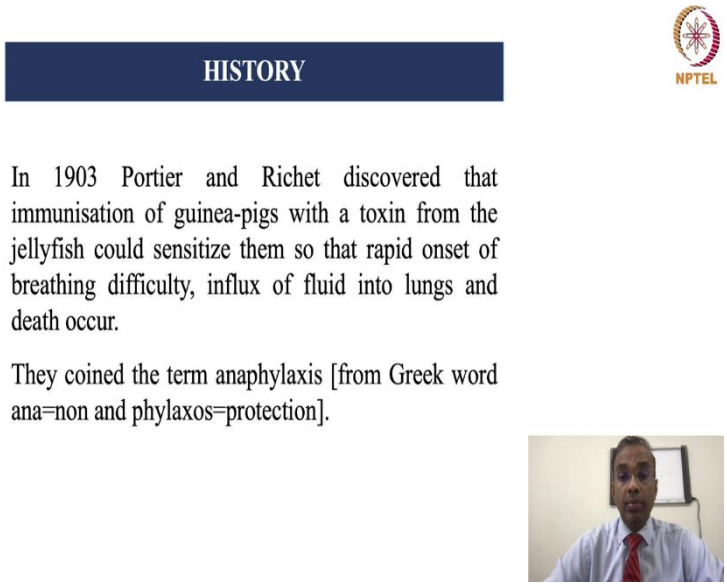
Hope you understand first dose, a second dose, we call it as a booster dose, and this booster doses, increase the immunity of a person but in unlike anaphylaxis, the subsequent exposure of this is harmful for the patient, it is not a protection for the patient, that is the main difference of phenological response of anaphylaxis as compared to a prophylaxis.

So, this true prophylaxis, anaphylaxis or anaphylaxis is a systemic reaction caused by an antigen specific IgE molecules which normally attaches these IgE molecules, attaches to certain

cells in the body which has some chemical mediators, which releases and these chemical mediators are potentially harmful, which can lead to a catastrophe.

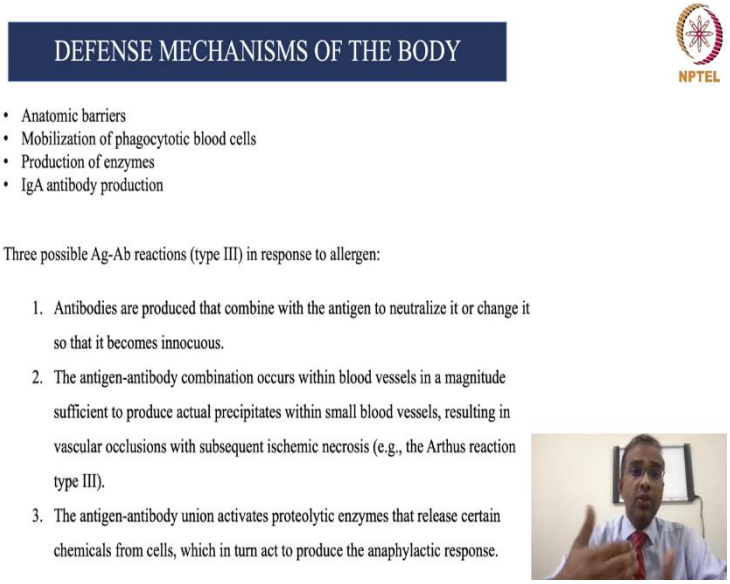
So, we have everything, we all the mediators which leads to a life-threatening system, our own body has it, but only this is a reaction that a hypersensitivity state is a state where in which these mediators are released into the body, can lead to a catastrophe at the later date. Now, let us understand I am sure it is a little bit confusing on this scale just put it in white and black.

(Refer Slide Time: 12:36)




Let us go prior to this, in only in 1903 Portier and Richet discovered that immunization when doing an immunization for the guinea-pigs with the toxin from a jellyfish, they could sensitize them, so rapid onset of breathing difficulty, influx of fluid into the lungs with brachial bronchospasm and the death of the guinea plex, that is when the discovery of anaphylaxis came. As I mentioned means there is no protection, the body has lost the protection.

(Refer Slide Time: 13:06)




So, when they say no protection, why they has body has an innate system, it is got a responses we have got anatomical barriers like skin the skin does not let anything enters and you have got even you got our immunological mediators, that inflammation system, then you have a phagocytic cells coming and your neutrophils little later, the lymphocytes everything, normally takes up any foreign body like a microorganisms into the body.

So, that is a mechanism and we produce enzymes, we produce antibodies, the specifically, the protective one is immunoglobulin A, these are the different mechanisms we have. In spite of this, these antigens, that antigen is one which stimulates the antibody it has basically, three type of different reactions which can happen in a body.

Number 1, the antibodies are produced that combine with an antigen and neutralize and change and become innocuous, that is what I said Ag-Ab. When you have an allergen coming into the body you have an antigen the antibody of the body, goes it is a defence mechanism, it takes care of the antigen, it nullifies, this matter settle, we do not have to worry about, the most of us have this mechanism, there in which we do not end up having any allergic reactions for that matter.

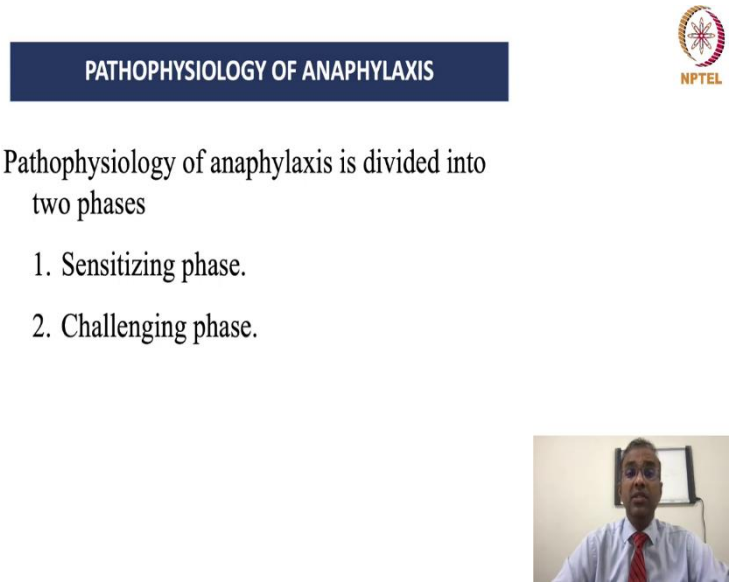
Type 2, the antigen antibody combination which occurs in the blood vessel like in a chemical media cellular mediated one, and it increases to a magnitude where in which that antigen or an antibody attached to the cells, they have joined together and they occluded. When, so they form an actual precipitate it can be a cytotoxic and it precipitates in the blood vessels and that can lead to small occlusions in the peripheral vasculatures and it can lead to an arithmetic patch across. This type of reactions wherein with the depositions of the precipitations in the blood

happening because of the antigen antibody reactions is a classic example, of a type 3 hypersensitivity that is Arthus reactions.

The last the type 3. the third type is antigen antibody union. The union of these two activates proteolytic enzymes means the enzymes which can rupture the proteins of the cellular membrane that can leads to degranulation, means release of chemicals which is normally present in certain cells which I am going to tell you in couple of slides now, that gets released.

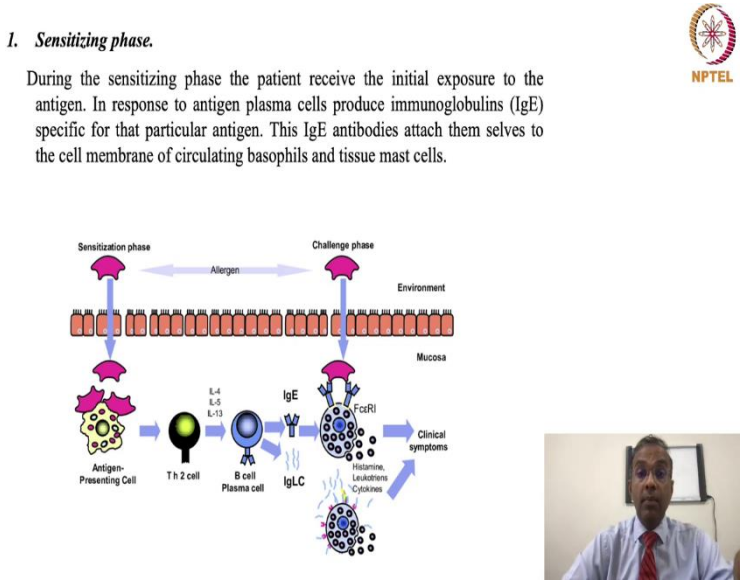
These chemical mediators, type 1, not to worry, type 2, the precipitation Arthus reaction, probably a dialysis or probably a kidney state to take care of it at the times, and certain mechanisms will help you, but in a type 3, an antigen antibody activation happens when there is a mediators released in the body, these mediators the one which leads to a complex system called as an anaphylaxis.

(Refer Slide Time: 16:04)




Now, coming to the pathophysiology, as I mentioned again there is two doses required, the pathophysiology of usually has two, one sensitizing phase, number two challenging phase, so let us understand what is it.

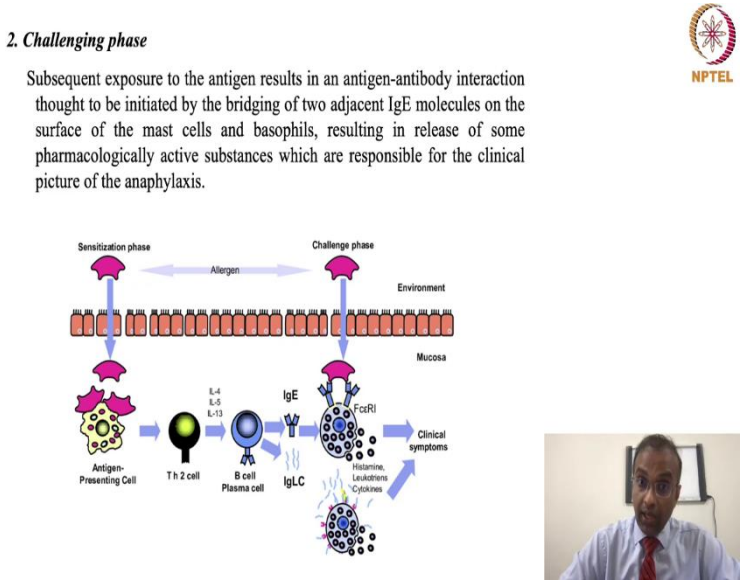
(Refer Slide Time: 16:20)




Sensitizing it, this picture clearly depicts both the sensitizing of the challenging phase, sensitizing phase is a phase in which a patient or an individual are exposed to an allergen probably, which is allergy. We call it as an allergen rather than an antigen at this point because this is going to elicit an allergic response this allergen or an antigen, when it enters the plasma and it goes in the cell it produces immunoglobulin E IgE, this is specific for the specific, for that particular antigen.

These IgE cells you can see that these IgE that looks like a T shape, the Y shaped blue colour one in the picture. This attaches itself to the cells which have a storing capacity of all these chemical mediators like your muscles or your circulatory basal cells and which is freely available in the bloodstream.

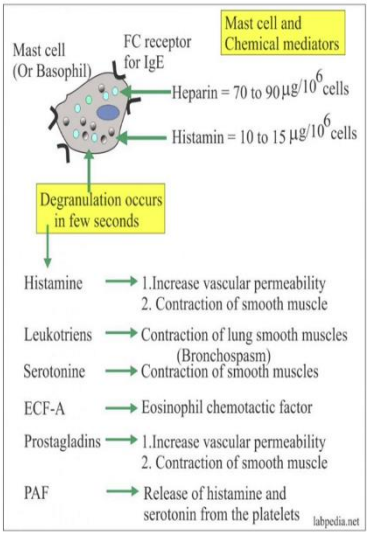
(Refer Slide Time: 17:16)




Once they are attached on a subsequent phase, when there is a repeat challenge, when the repeat challenge of a same allergen entering into the plasma, entering into the blood, now you have got an IgE already produced in the body, and you got an IgE attached and ready to attack on your muscles in the base of it.

When these allergens get itself binded or bounded to the IgE molecules which are attached itself on the receptors of the muscles in the basal pills leads to degranulation means leads to proteorate proteolysis of the cell that releases lot of molecules means your mediators these mediators are the one which leads to clinical symptoms that what we call it as an anaphylaxis, an allergy reaction. What are these reagents, like histamines leukotrienes and cytokines?

(Refer Slide Time: 18:13)



Let us go in in detail about it. Now, you have a Mast cell, so in normal Must cell they have in innate lot of chemical mediators by itself it is called like a heparin insert 70 to 90 micrograms, histamine 10 to 15 micrograms, these are the normal constituents of a Must cell or even a base of insulin matter. Once the receptor, your once the receptor is activated, the IgE complex is activated and the degranulation of these Must cells, the basophils happens, these the different chemical mediators when they are released.

In the predominantly, the histamine it is a main culprit, you cannot forget the name of histamine because this is the biggest culprit which leads to a lot of allergic reactions, that is why we given the medication part you might have read in your pharmacology classes, that antihistamines are the drugs of a drug of choice. Let us get back to this. Histamine, it leads to increased vascular permeability, what do you mean? but let us understand individual thing because this slides it if you understand the individual chemical mediators and what it causes. You understand the whole pathophysiology of an anaphylaxis or an allergy in particular.

Increased permeability, means what is happening? The blood vessels become more permeable when it more premia's the intravascular volume is getting decreased because there is a shift of blood or your plasma from intravascular to the extravascular structure. When there is increased extravascular volume, why we call it as oedema you understood, intravascular when it goes to extravascular that concept is called as an oedema.

With the oedema, you might have heard about laryngeal oedema, you have got the facial element widespread oedema, according to the energy is caused because of this increased vascular permeability mainly caused by instrument and also it leads to it caused by in the latest stage by even prostate gland lens also.

And, the second most important thing is contraction of the smooth muscles. Smooth muscles, we have got an abdominal stroke muscle, you have got a laryngeal smooth muscle in the breathing pathway and even the lungs have got a smooth muscles. When this acute contraction of the smooth muscle happens that is when the patient gets abdominal cramps in case of anaphylaxis and breathing difficulty because of the contraction of the airway can lead to, can be caused due to the systemic reactions.

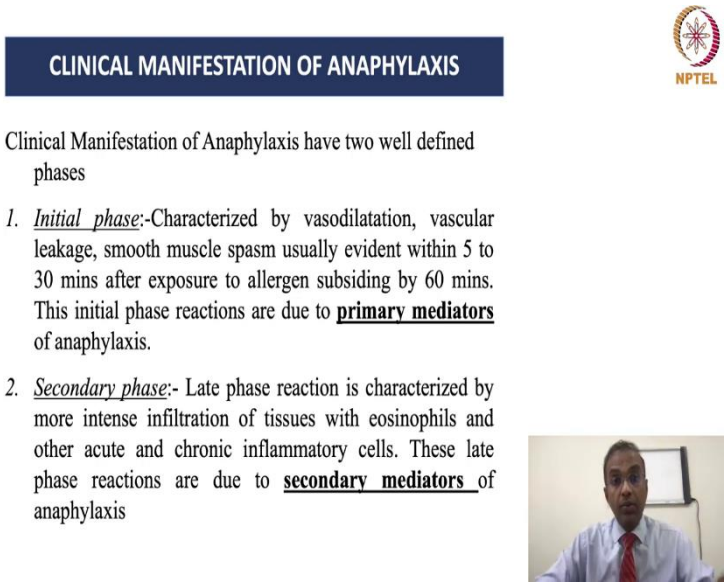
Then the second molecules is leukotrienes, and this is also very notorious because this specifically contracts the lung smooth muscles that is leading to a bronchospasm. So, bronchospasm, difficulty in breathing, patients unable to break, probably trying to gas,

probably even the saturation drops down, if it is not adequately addressed in on time, it can be a building difficult, and you can a patient can be a hypoxic also.

Serotonin, contraction smooth muscle, and isnophilic chemotactic factors, prostaglandins, as I said is to increase the vascular permeability and contractions smooth muscles again and platelet adhering factors, these factors at the later stage, because not only the mass and vascular mind, even platelets have abundant amount of these histamines stored in the platelet also.

So, on a later stage as the time progresses, like probably couple of hours from now after the insulin cell, the platelets also start releasing the histamine, that is the reason why a prolonged effect still lingers on. So, that is the reason why a long term at least in 48 hours management with anti-antihistamines or anti allergies are always required for the management because of the late release of the system in from the platelets.

(Refer Slide Time: 22:12)



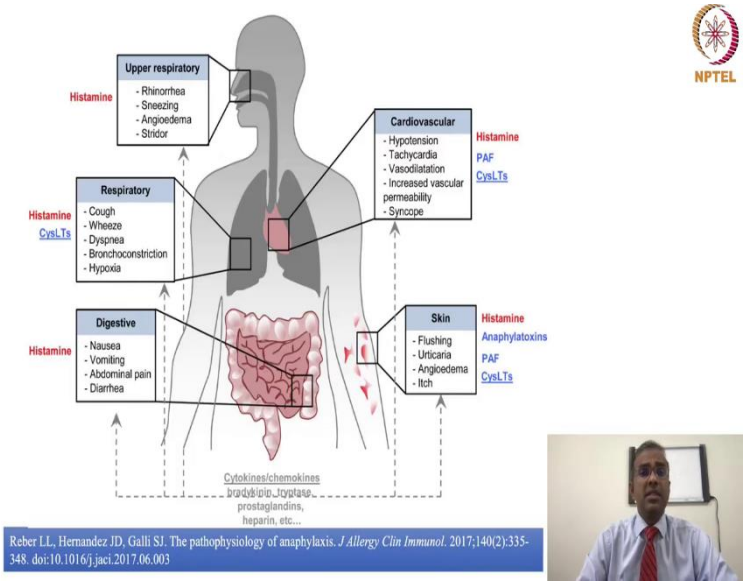

Now, once you understand how is this everything is, what is causing this anaphylaxis. Let us understand how, what exactly happens in anaphylaxis. We understood from where the mediators come, what a system in its bronchospasm and soft tissue constructions and erythema and everything, but how does it manifest.

Manifestations usually is in two stages what is initial phase and the secondary phase, the initial phase is predominantly by your muscles, no second thoughts about it, so it is characterized by as I said vasodilation, vascular leakage that is transfer of intravascular content to the extra vascular strain contents leading to a widespread oedema, smooth muscle spasm, evident usually

this whole sequence you can see it in the initial couple of minutes to maximum 30 minutes or so, something like that.

So, at pinard's time, the initial phase is slowly, it does not stop there, it is taken over by the secondary stage. (())(23:18) it takes over the second station that is where your secondary mediators comes. In your secondary mediators your eosinophils and your platelets in the later stage, these also start secreting the chemical mediators. So, though the manifestations starts acutely in initial phase, it keeps prolonging over a period of time because of the multiple cellular components which are getting into action and leading to an emerging association called as an anaphylaxis.

(Refer Slide Time: 23:52)

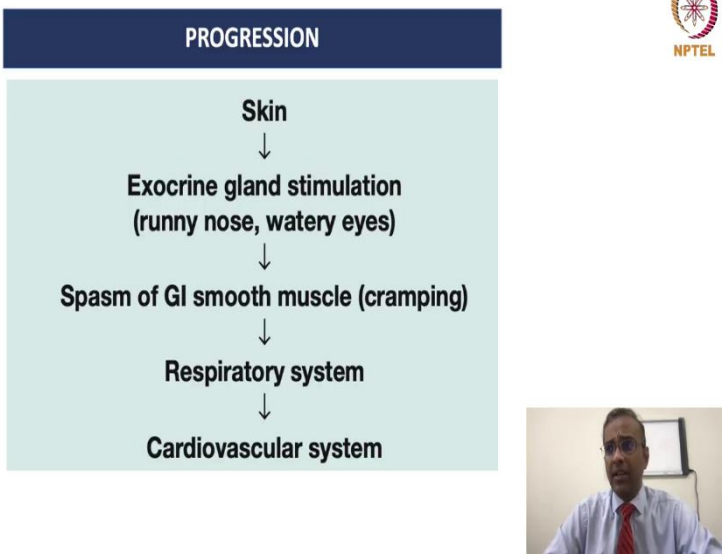



So, what happens, when this whole sequelae happens? Now, there is a different systems are involved, number 1 upper respirators and if you take up the upper respirator system in a simple allergy, it can be a runny nose, we call it as rhinorrhoea or a sneezing, angioedema, strider, life threatening straightness of white leather threading, at times you need to, you need to go for either intubation or do an emergency tricots to leave the patient with a strider.

Respiratory because of the bronchospasm, can be cough, wheeze, dyspnea, bronchoconstriction and hypoxia and ultimately can lead to anoxia if not treated on time. And, as I said because the smooth muscles are affected by your histamines, it can also lead to nausea, vomiting, abdominal pain, diarrhoea. And, the first one as I said to elicit is the skin, your flushing, urticaria, angioedema, and the common is the itching, the patients get itching the moment you elicit the allergy.

And the last one usually is your cardiovascular, that is normally at the end stage probably as the disease progresses or the pathophysiology progresses it enters with hypertension, tachycardia, vasodilator, widespread vasodilation, increased vascular permeability and another day the patient goes to a syncope. It is not just like a syncope which normally happens in dental clinic with a brick shock, this syncope means the patient is going for an unconscious stage which can in turn leads to a cardiac equal either way of being a total cardiac arrest for the patient.

(Refer Slide Time: 25:32)



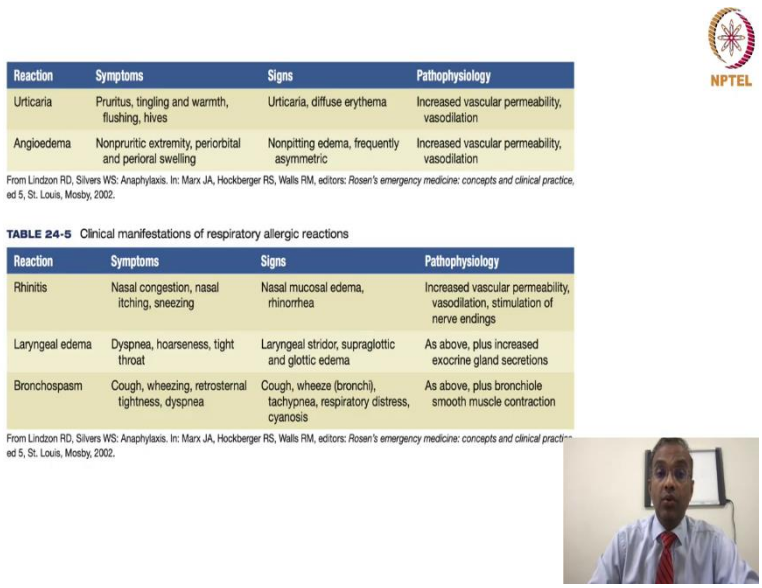

But this all does not happen all of a sudden you mean the moment, you give a brick shock on the patient, get an abdominal current, it does not go into cardiac arrest and just collapses, it gives time, it normally starts with the skin if you have an uretic area, your rashes, angioedema your facial puffiness, then it comes X occurring glands, your runny nose, watering eyes. Most of your seasonal allergies what we get, like for example, you have got dust allergy or winters you have a runny nose, this usually stops at this level, it does not go beyond this.

And at the later stage, you get a GI spasms, the cramping you get a wide spread cramping on the patient complains of that is patient in your clinic you have just given shot of la or probably one drug you are injected, he just mentions about something and he is complains of being a discomfort, you have to think there is something happening, that is where the, that is where as a clinician's point is very important to know that. Allergy is not about only puffiness, allergy is not about only angioedema, allergy is not anaphylaxis, not about always having going for a tracheostomy, and ugly identification at the skin level or the running nose level are the best is your abdominal cramping.

Give him a shot, give him a shot of the drug which is to be required, give an anti-allergic, you can prevent a catastrophe. Once it is not done, it progresses to the respiratory state that is where the bronchospasm comes. Then you have to do it probably, you have to, airway management systems and you need to end up doing an intercostal for the patient to leave it to give an adequate airways airway for the patient.

And the later stage, if it is untreated till, then it can go for a cardiovascular system because cardiovascular is as also mediated by the mediators, you are, as I mentioned the chemical immediate solutions has an effect on the card, not only that with hypoxia, there is an increased cardiac load, that increased cardiac load seconded by hypoxia and widespread hypoperfusion because of the increased permeability can end up patient into an afterload that leads to a cardiac arrest unlimited. So, it had to, this is all the progression, so we do not want any patient to die on a dental chair or a cleaning, so we, it is always better to identify and address the patient as early as possible.

(Refer Slide Time: 28:01)



| Reaction | Symptoms | Signs | Pathophysiology |
|---|---|---|---|
| Urticaria | Pruritus, tingling and warmth, flushing, hives | Urticaria, diffuse erythema | Increased vascular permeability, vasodilation |
| Angioedema | Nonpruritic extremity, periorbital and perioral swelling | Nonpitting edema, frequently asymmetric | Increased vascular permeability, vasodilation |

From Lindzon RD, Silvers WS: Anaphylaxis. In: Marx JA, Hockberger RS, Walls RM, editors: *Rosen's emergency medicine: concepts and clinical practice*, ed 5, St. Louis, Mosby, 2002.

**TABLE 24-5** Clinical manifestations of respiratory allergic reactions

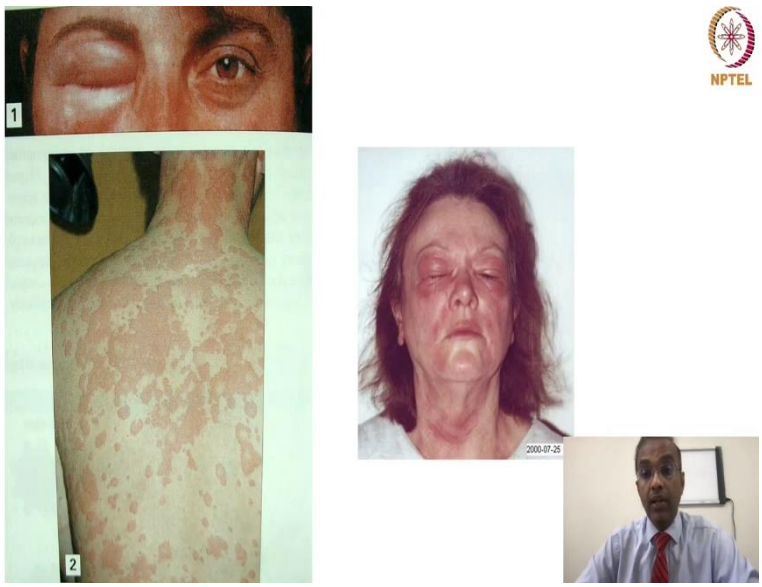
| Reaction | Symptoms | Signs | Pathophysiology |
|---|---|---|---|
| Rhinitis | Nasal congestion, nasal itching, sneezing | Nasal mucosal edema, rhinorrhea | Increased vascular permeability, vasodilation, stimulation of nerve endings |
| Laryngeal edema | Dyspnea, hoarseness, tight throat | Laryngeal stridor, supraglottic and glottic edema | As above, plus increased exocrine gland secretions |
| Bronchospasm | Cough, wheezing, retrosternal tightness, dyspnea | Cough, wheeze (bronchi), tachypnea, respiratory distress, cyanosis | As above, plus bronchiole smooth muscle contraction |

From Lindzon RD, Silvers WS: Anaphylaxis. In: Marx JA, Hockberger RS, Walls RM, editors: *Rosen's emergency medicine: concepts and clinical practice*, ed 5, St. Louis, Mosby, 2002.



How to go ahead and what to do? Now, these are the reactions and symptoms which normally skin reactions like urticaria or an angioedema, arctic area is now tingling in the tingling and feeling of flushness and pruritus and these are the signs which you can find because mainly due to the increased vascular permit, but as I mentioned the first sign from a histamine in which leave first thing that a visceral does is you are increasing the vascular permeability, so you affect all the things which is related to a vascular permeability. On the second stage, you get the rhinitis that is nasal congestion, nasal itching, langella oedema, and bronchospasm and so on.

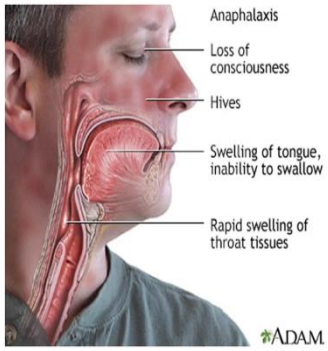
(Refer Slide Time: 28:40)




So, this is how a typical rhinitis or arctic area looks like. You can see a widespread patches, you can do redness, you for your patients get a readiness puffiness in the face and mind you it is unlike any other disease like it is usually not symmetrical, it cannot, it might not be in it, you do not expect the oedema to come on both sides of the face or both sides of the body it is it might be asymmetrical.

Like the picture, in the top, you see angioedema are covering the eyes only on one side, but on the second picture the lady has got a bilateral one, it is not it can be how it predicts it presents the way it wants it cannot be predict they cannot say it is unilateral it cannot be bilateral, it can be different but end of the day, yes, because of the increased permeability there will be an angioedema, there will be a pyrites, there will be an itchiness, which in the skin conditions, comes in the next it goes to the nose, puffy nose, then it advances to the level of GI system, where you got an abdominal cramping, and the later go to the bronchospasm on the cardiovascular.

(Refer Slide Time: 29:49)

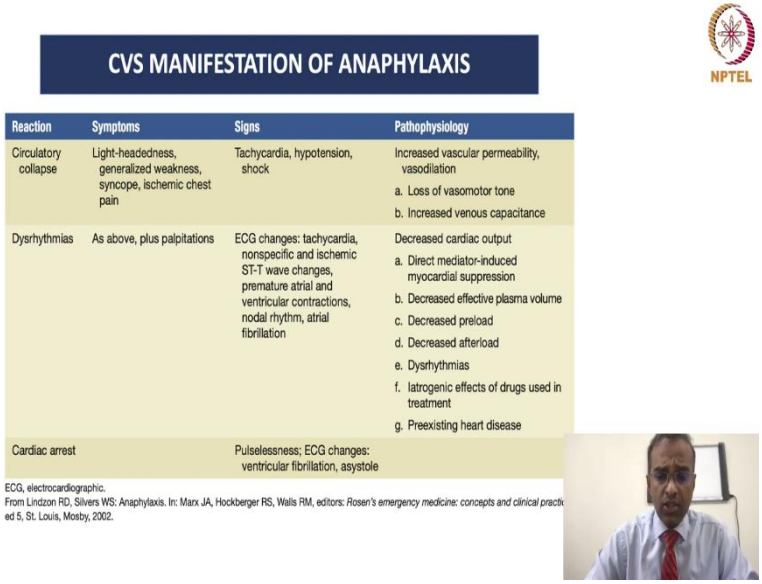



This picture here, you can see this, this is a, forget about the loss of consciousness here, hives is the nasal thing, the why is the breathing, you do not have to wait the, why is it breathing is such an important thing in an anaphylaxis. Yeah, though I said the bronchospasm happens slightly in the lead, it slightly means it does not wait for us to gather it the whole thing as a sequence it usually happens within 5 to 1 to 1 hour.

So, within you have a time of 1 hour but during the initial palm increased vascular permeability in the oedema stage, you know the tongue is a highly vascular structure, a lot of blood vessels in the blood, so that means in this permeability in the tongue, it means a oedema in the tongue, what happens if the tongue oedema happens, the tongue is swollen down.

Once the tongue is swollen down, it is swollen up, it blocks the airway, we are released, worried about eating at this point of time because life is more important this point. When the tongue is increased, you can see it compresses the airway, it compresses the airway. Not only that, even the soft tissues along the trachea, they are all soft tissue that starts swollen up because it is all highly vascular, soft tissues are vascular, the ones with vascular enriched permeability that leads to an oedema and that leads to narrowing of the aerobic space, that is the reason why the patient goes to hypoxia and leads his consciousness and worry, that is what we call it as a syncope uninterest, it can have the syncope or whatever.

(Refer Slide Time: 31:21)



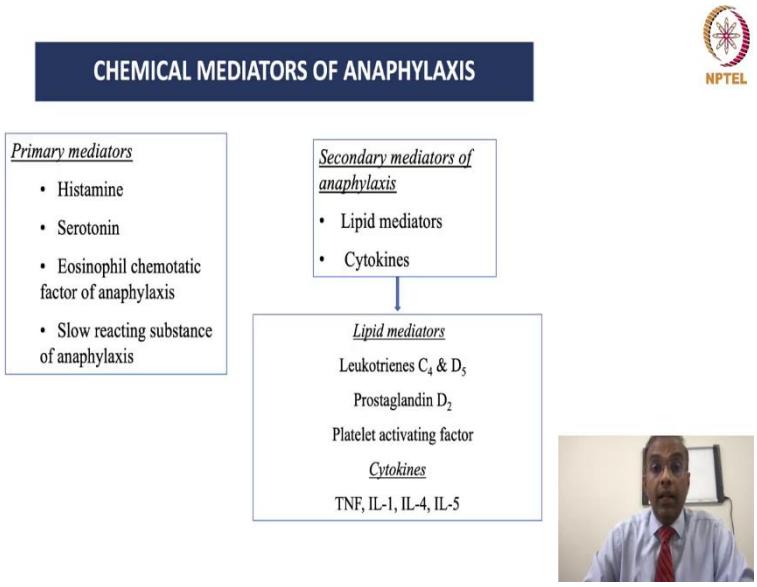

Once we are not able to, if you fail to identify at an initial stage or till at least the bronchospasm stage, if it goes to a CVS or a cardiovascular system. As I said it, going to be a circulating collapse as why because of the increased permeability, a loss of volume, and the loss of vasomotor tone, because of smooth muscles spasm the tonicity of the vessels have lost, that leads to hypotension, they decreased in the blood pressure level and increased veins capacitance means increase veins our load is more because, there is lot of oedema the tissue keeps coming in but there is no contractibility of the vasculature hypotension, that is a condition we call it as a shock.

With this shock, the heart tries to manoeuvre, your body is such a beautiful system, it tries to adopt, how does the heart adopt by the decreased volume? By becoming a tachycardia which has to be attacking it keeps floating or deep contracting at very rapid face that is where the tachy happens, when the tachy happens, it might be a non-specific that can lead to an a state might be dysrhythmia means arrhythmia which is irregular, when the contractions are irregular, it can be a ventricular contraction, atrial fibrillation or these can be usually picked up on an ECG, this again be more catastrophe, if the patient has got pre-existing cardiac diseases, fine.

As I already said, but what if the patient is already a cardiac patient, already he is got a, he is undergone some cardiac procedure, a valvular replacement, or he is got a pre-existing ventral atrial fibrillation. This gonna be a very big catastrophe, you do not have time, the patient to be collapsed, he is going to cardiac arrest. So, end of the day, the cardiac arrest is, if nothing has happened that in ultimatum the patient goes to a systole. A systole means there is no contractions to the heart, that so then you do not have anything you just have to start your ABCs

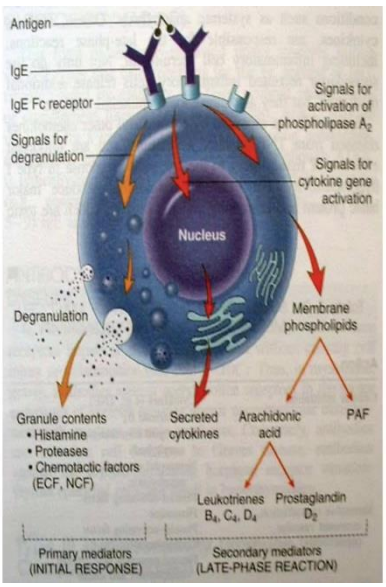
that is cardiopulmonary resuscitation has to be started initiated immediately and you need to call for help.

(Refer Slide Time: 33:42)



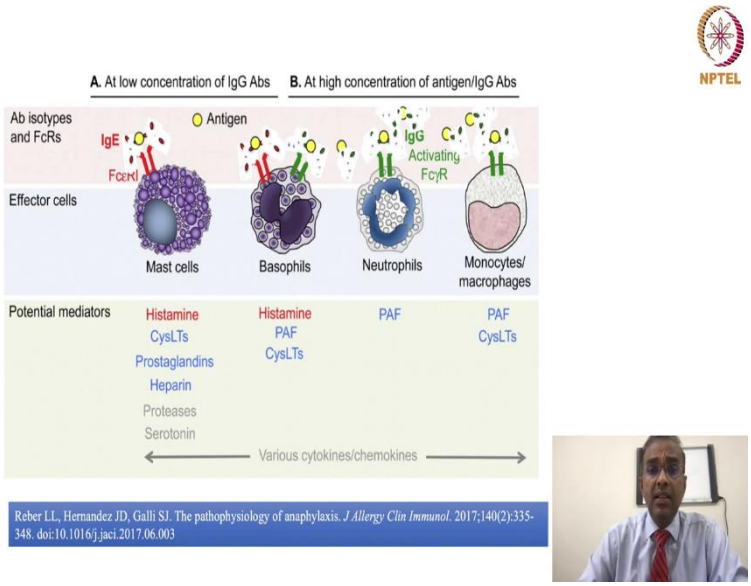

Now, that is all about how and starting from a simple skin erythema at death due to anaphylaxis can happen, I will just try to explain to you the sequence of how it happens. Now, the to summarize again, these are the primary and the secondary mediators of anaphylaxis, histamine, serotonin, isnophilic chemotactic factors for anaphylaxis, slow reacting substance of anaphylaxis. And secondary mediators we have lipid meters like cytokines, leukotrienes, interleukin 1, interleukin 4, and interleukin 5, and platelet activating factors. I told you how important these interleukin factors are, because it even acts with the later stage.

(Refer Slide Time: 34:32)



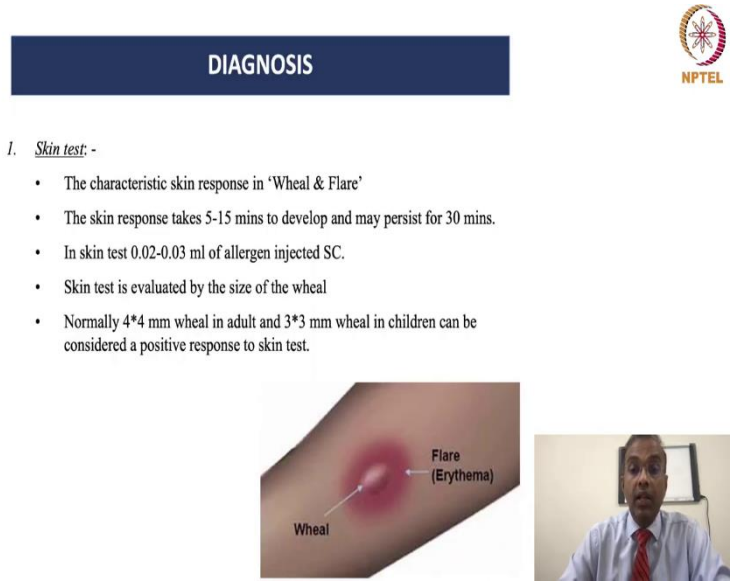
Now, this is again, summarize the pictorial summarization of how the whole mechanism works here. Just to make sure, you remember the whole sequence here, you have got this is a picture of a mass cell, you have got a y-shaped IgE receptors which is attached to the mass cells because due to the initial sensitizing dose, when once the antigen attaches to the IgE that leads to degranulation at the initial stage which leads to release of granules, leads to immediate initial primary response, that histamine proteases and chemotactic factors. And on the secondary stage that is slightly delayed late face, you get prostaglandins, and leukotrienes are released from the same muscles which leads to a delayed are probably called as a late phase reactions. So, this is how the whole pathophysiology of anaphylaxis is mentioned.

(Refer Slide Time: 35:32)




Not only the mass cells, as I mentioned other cells also releases substances here. Now, majority being the muscles we have got histamines, main culprit prostaglandins and their parents are stored and released and even the basophils, again histamines but a regular neutrophil that is your first line of defence in the body that releases PAF, if there is Platelet Activating Factors when the monocytes leaves this PAF, if that is Platelet Activating Factors which leads to internal release of histamine from platelets. That is why, that usually requires a higher amount of concentrations of antigens to do, but still it can, if it is uncontrolled at the initial stage, it can in turn activates the platelet degeneration and release of histamines.

(Refer Slide Time: 36:19)




Now, coming to the diagnosis, that is all about how what happens. Now, let us let us see how to diagnose, and how to prevent it on, how to treat it. There are mainly a two the different tests we normally can do, one is skin test. You all, I do not know how many of you have taken a penicillin shot, when I am still, remember when we were kids, we used to take shots of penicillin. Every time a pencilling was given, we used to get a test dose on a fore arm here. We used to get a pristine.

The, what is it? it is about, it is called as skin test where we inject a small amount this 0.2 to 0.02 to 0.03 ml of this any drug which you are suspected to be an allergen is injected subcutaneously and leave it for 5 to 10 minutes, you can see the response maximum to 30 minutes, you can see a response that response is called as a Wheal and the flare. Wheal is a central dot and a flare, the Wheal cannot you do not have to be a bigger one, normally, I have seen my residents are waiting for a Wheal to minute probably a centimetre or two, no, it normally have it has to be around 3 or 4 millimetre thickness of a small Wheal. And the flare, means it is a flared is an erythema which spreads around the Wheal. So, this is a diagnostic tech means, it means the patient is allergic to that specific product, so you have to be little bit cautious of that.

(Refer Slide Time: 37:47)

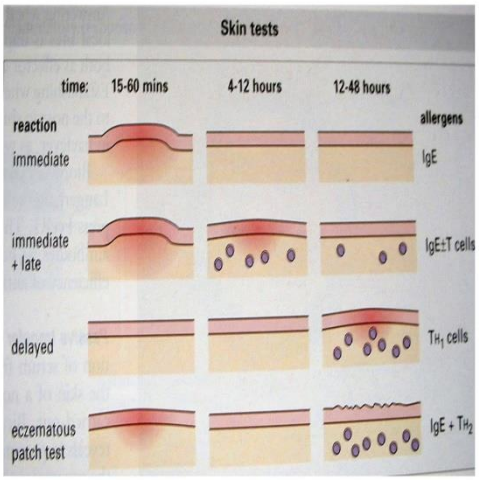
2. *Patch test*: -

- This test include application of a patch of 10µml on 2.5cm$^2$ gauze that stays on the skin for 2 days.
- After 2 days biopsy is taken from that area.
- A positive patch response induces macroscopic eczema and an infiltrate of cells into the dermis. Cellular infiltrate include eosinophils, basophils and lymphocytes

That second one is a patch test. I will tell you the significance of what is a patch test and then consider subsequent slides. Here, you do not inoculate anything, we do not give a subcutaneous injection, rather you apply a topical gauze or whatever allergen you are talking about it you can impregnate on a gauze and a small patch, keep it attached to the skin, you put it and tape it around the patient for 2 days and after 2 days, you take your biopsy of the skin. You take a small pinch of the skin and take a biopsy and to see the what is the cellular response for that.

In a non-allergic patient, you do not get to see a lot of inflammation happening underneath in the skin, but in a positive patient, when a positive patient, you can see and in eczema that is erythematic patch reaction on the skin and we see a lot of cellular infiltration by eosinophils, basophils, and lymphocytes based on underneath the skin. This is a quite a confirmatory test for allergy. Skin test is what we normally do it on a clinical chair side, but patch it is a confirmatory it has to find out.

(Refer Slide Time: 39:00)




Why it is confirmatory? you can say this here, like the initial response like 15 to 30 minutes normally in the immediate response, we do not do it. Only, if you expect to be an allergy, a very severe allergy or an anaphylactic type reaction you get an initial response or normally you get a late response up to 4 to 12 hours, but in a later stage you can see the delayed response, you can see the delayed and the examiner's patch test after 12 to 14 hours you can see all the mediators response are heightened only at the 12 to 48 hours.

That is the reason why the patch test is quite diagnostic and with confirmatory, because we are waiting for the 48 hours the full potential of the immunological response to be active, then you have microscopically conforming the infiltration, infiltrate of these cellular responses and that is the reason why it is a confirmatory test.