Management of Medical Emergencies in Dental Practice
Professor Doctor Eapen Thomas
Department of Oral and Maxillofacial Surgery
Indian Institute of Technology, Kerala
Thyroid Dysfunction

Hi. Welcome to another Episode of the Management of Medically Compromised Patients. I have already mentioned the importance of knowing about the various conditions and how to deal with these patients. So, that one can actually prevent almost 90 to 95 percent of the complications that one can see in dental practice.

So, today let us continue with our session on medically compromised individuals. And Myself Dr. Eapen Thomas, Professor and PG Guide Department of Oral and Maxillofacial Surgery, Pushpagiri College of Dental Sciences, Kerala.

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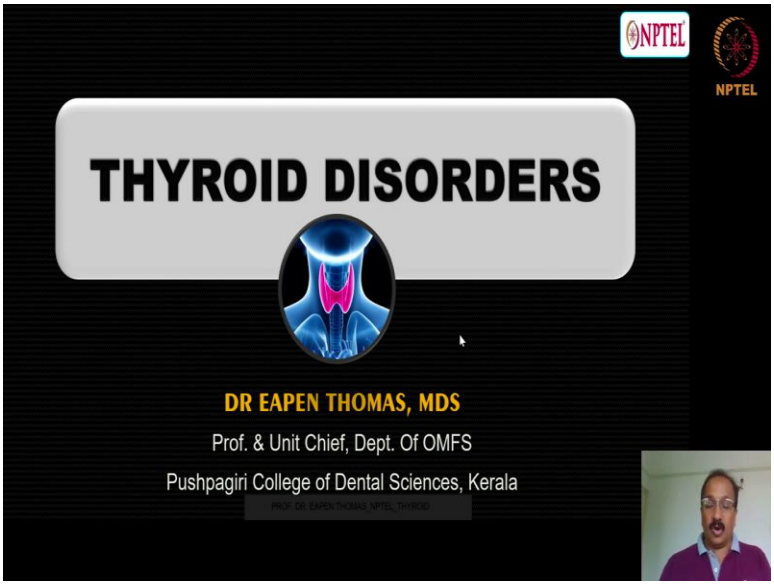

And today we will be taking another one systemic condition or a systemic disorder, mainly something which is connected with our thyroid gland, let us speak about the thyroid disorders. And what are the problems associated? What is thyroid gland? What are its function? A little bit about the basic physiology?

What are its pharmacological actions? Its interaction with the various systems, and how is it being controlled, the levels is being controlled? And what problems are we facing? If you deal

with a patient with the hypothyroidism or hyperthyroidism, and how to deal with some patients, and what are the complications that we can face?

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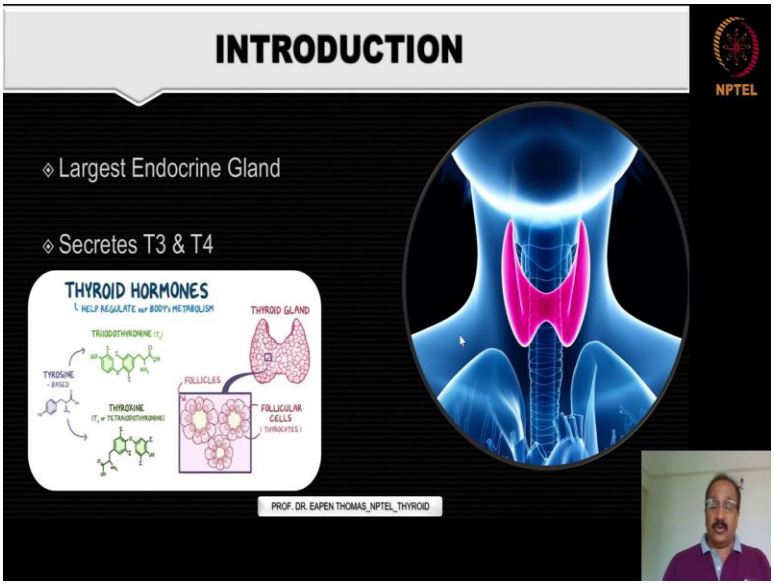

Well, as you all know, thyroid is the Largest Endocrine Gland in the body. It is located on the neck, about the thyroid cartilage, and it has predominant functions, a main function is the secretion of two important hormones that is T3 Triiodothyronine and T4, and Tetraiodothyronine or the thyroxine hormone.

So, these hormones are very much essential for various actions and functions of the body. So, these two hormones are principally secreted by the thyroid gland, which is the largest endocrine gland situated on the anterior aspect of the neck. And the whatever I did, which is coming from your dietary intake is all been taken up by these thyroid follicular.

And then they combine with this so called a tyrosine. And they form two major hormones that is a T3 and T4. And what I told earlier, it is about Triiodothyronine that is T3, or a T4 is Tetraiodothyronine, or thyroxin. The Tetraiodothyronine T4 the inactive form, it gets converted to T3 and T3 is the active form of the Thyroid Hormone, which brings about predominant effects of the Thyroid Gland.

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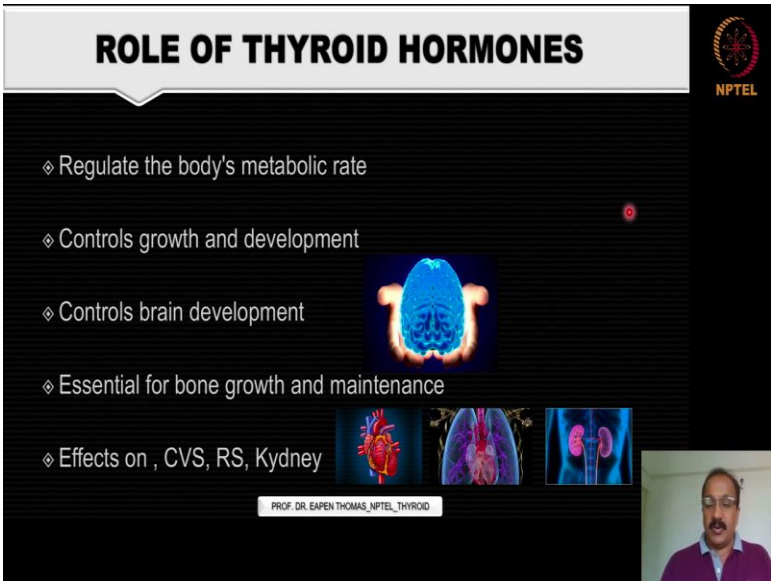

Now, let us see what is the role of these thyroid hormones, how does it influence the body? Now it helps very much in maintaining the metabolic rhythm of the body, it is very much important for all the activities of the body, the cells turn about the metabolism of the entire thing, exactly based on these thyroid hormones, their secretions control the metabolism of the human system.

It also has got a predominant action on the growth and development these two hormones and very essential for a normal growth and development. And disorders of this could be associated with problems associated with the growth and the development of any individual. Then it is very important for the growth and development of most of the cells of the body, predominantly the brain cells. And if there is no adequate hormone, they can be deficiencies of that.

And you can see the impaired brain growth and the associated signs and symptoms. It is very well required for the bone growth and even maintenance of the health of the bone also. So, you have to be very much concerned about these, you have to know about all the actions of these hormones, how important and what an important role it has on all the systems of the body.

And it also has a predominant action on the cardiovascular system, the renal system, as well as the respiratory system. So, basically, as we have seen, now this is predominant as one of the important hormone, which has got predominant action secreted by the thyroid gland, influencing almost all the systems of the body, or the cells of the body. It is very predominant in the

metabolism and the growth and development and always, I mean, achieving maturity of all the cells with this predominant action, all these particular organs.

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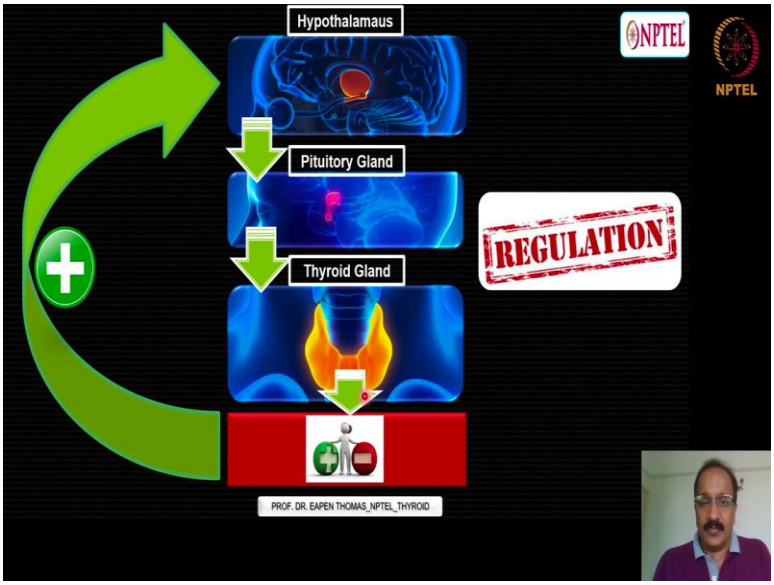

Now let us see, how are these particular hormones regulations? How are secretions being regulated? Now in a situation a normally individual, there is always a balance between the hormone and the control or the regulatory centers. So, with all these, particular system, act on something what we call us feedback system.

The positive feedback system, and the negative feedback system, whenever there is an increased level of the hormone in the blood, when you want to reduce the level of the hormone, what happens, an inhibitory impulse goes, whereas whenever there is a deficiency, when you need more hormone, there is a stimulatory effect going to (())(4:49) and let us see how that thing works.

In a situation where there is a deficiency of these thyroid hormones in the blood. So what happens? There is a stimulus, a positive stimulus, which is going onto the Hypothalamaus**.** The Hypothalamaus is the high command or the high command of the main which controls a lot of activities of the body. So, a positive stimulus to the Hypothalamaus actually releases a hormone called TRA, thyroid releasing hormone and that acts on the Anti-Pituitory.

This Anti-Pituitory is one of the very important vital organ which actually has got a pivotal control in the mechanics of various endocrinillogical orders. Now, this Anti-Pituitory again releases TSH, what we call us a thyroid stimulating hormone, which secretion and which is comes and stimulates the thyroid to secretes the amount of Thyroxin. So, that goes into the blood and the levels are met with.

So this is what happens, whenever there is a deficiency of thyroid the stimulation goes to the Hypothalamaus, Hypothalamaus secretes TRA thyroid regulating hormone, which acts on the Anti-Pituitory, which releases thyroid stimulating hormone and this thyroid stimulating hormone acts on the thyroid gland releases thyroxin and the levels are met with. I hope that is understood. Now, let us see the reverse situation.

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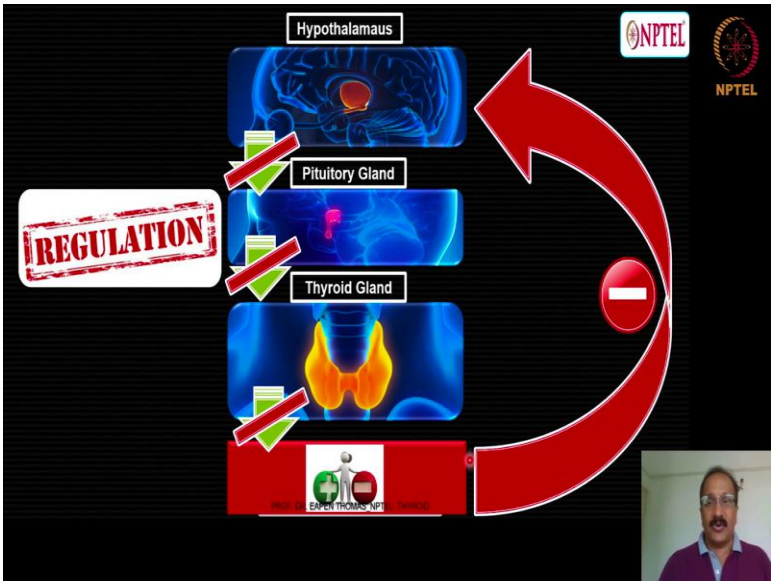

What happens when there is excess of thyroid in the body when there is excess of your hormone in the blood either because of an exogenous drug intake, or because of some disorder of the gland about disorder of some sort of a tumor of something gland which creating a lot of thyroid. So, in such situations, whenever there is an excess of thyroid, what happens, let us see.

In this situation, unlike the other versus stimulatory, here it is going to be having a negative impact, and negative impulse goes to the high command the Hypothalamaus. So, what happens the Hypothalamaus do not secrete any hormone to the Pituitory gland and indirectly, there will

not be any stimulus for the pituitory gland and thyroid stimulating hormone or TSH is not released from thyroid gland. And hence, the secretion of hormone to the blood is cut off.

So, that is how the regulatory mechanism, the negative feedback works. So, whenever there is a level, which is going high, you have a negative feedback. Whenever there is a level which is low in the blood, you got a positive feedback. So, basically, there is a balance between these two regulatory mechanism which always maintains the levels of thyroid in the body. Now, this is how it is acting.

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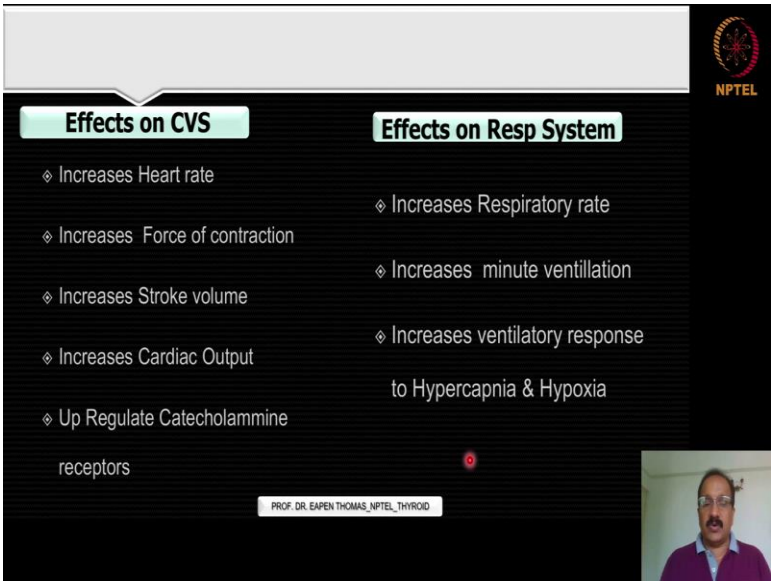

Let us see, what are the effects of these thyroxin or thyroid hormones on? I have told you it is has got action almost all the system, let us see what are the predominant actions of these thyroxin on cardiovascular system, it very stimulated to the heart, it act on the hearts and brings about an increase in the heart rate or the heart rhythm is increased.

You will feel that a higher rapid rate of pulse or tachycardia in these type of patients is quite common. And the whole thing is the force of contraction of the heart. So, myocardium, contracts at much faster rate and increase rate also, thereby, there is an always increased cardiac output and increase stroke volume. Because I have told you earlier, patients who is having a hyperthyroid, or the thyroid hormone, actually has got its own functions on the system.

So, all these are actions on the CVS, actually the effect of thyroxin increases heart rate increases the force of contraction and increase of the stroke volume. And thereby there is an increase in the cardiac output that is something what you have to understand. And it actually sensitizes, this thyroid hormone sensitizes, the effect of Catecholammine, your adrenaline or noradrenaline, which is actually secreted in the blood in response to stress already have a stimulatory effect on heart. So, in the presence of this thyroxin, the action is actually regulate or is higher.

So, basically, that is what I meant by the last point there, these thyroxin hormones, they upregulate or sensitizes the myocardium to the effect of catecholammines. So, that is in brief about the action of this cardiovascular system. Let us see what happens to the respiratory system, it increases respiratory rate, more than the normal, and it is got a stimulatory effect on the respiratory system too.

It also has got effect on the minute ventilation and increases that response of the, your lungs to Hypercapnia, Hypoxia. A situation wherever there is a higher level of carbon dioxide is called Hypercapnia. A situation where there is a lower level of oxygen is called Hypoxia. So, the lung or the respiratory send the response to these situations are also regulated by these thyroid hormones. So, that is the effect of thyroid hormones on the respiratory system.

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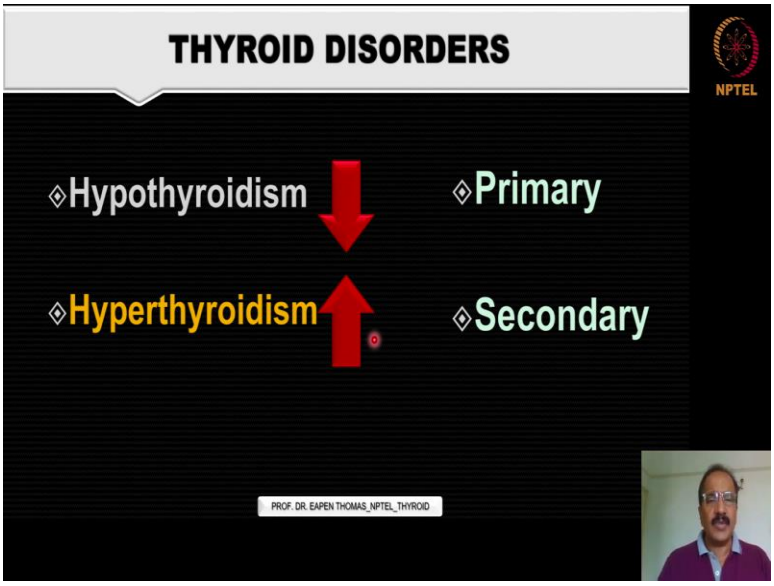

Now, let us see what are the thyroid disorders? What are the disorders associated with this thyroid gland? They are predominantly two conditions, one, in which there is a reduced secretion of thyroid hormone, which we call it as hypothyroidism. And the second condition is an increase the level of thyroid hormone, where we call it as hyperthyroidism.

So, these are the two situations of thyroid disorders, a hypothyroidism and hyperthyroidism and two other terminologies also, I would like to bring to your notice in this particular scenario, that is primary disorder and the secondary disorder. Both, this hypothyroidism or hyperthyroidism can be primary or secondary.

When I say primary, that means the disorder is actually within the, your thyroid gland substance, that means the problem is connected with the thyroid gland. So, that is when we call it as a primary disorder. If the disorder is associated with the thyroid gland and thyroid gland does not secrete your thyroxin hormone, we call it as Primary Hypothyroidism.

If there is an excess secretion by the gland because of some tumor or something like that, we call it primary Hyperthyroidism. Same way if there is no problem with that gland, but it is by virtue of the secretion from the higher from the higher authorities and the Pituitary or the high command, because they are continuously stimulating.

And if the result of these particular hormones is high, it becomes a secondary disorder. So, any problem or alteration in the level of these thyroxin hormones, if it is by pure virtue of the disorder of thyroid gland is called a primary disorder if their thyroid gland is normal, but if it is a disorder of the Pituitary or the hypothalamus, we call it as a secondary. So, that is about the thyroid disorders. Now, let us move on to the next one.

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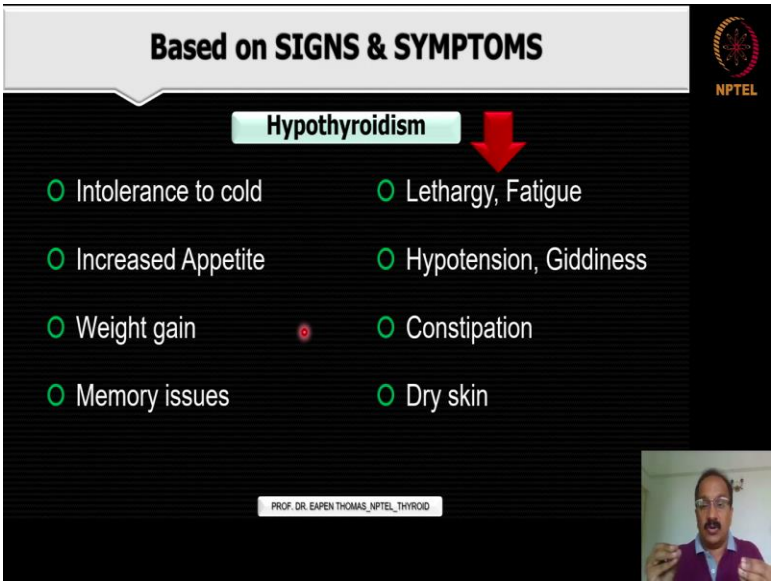

How do you know identify the most problem with these thyroid patients when they come to your clinic is we do not know actually how the what sort of a disorder they are like whether it is actually a hypothyroid or whether it is a hyperthyroid because most of these patient they are not aware, they actually consult a doctor, doctor gives them medications.

And then based on that medication they take and the thyroid is controlled. So, they actually do not know what is hypothyroid and hyperthyroid. But it is very important for us to understand whether the patient is hypothyroid or hyperthyroid because the problems associated with the hypothyroid patient in dental clinic and the hyperthyroid patient.

Dental Clinic both are totally different. The management is also totally different. So, it is very important for us to understand whether the patient is suffering from hypothyroidism or hyperthyroidism. Now how can we do that? We can make out on two or three reasons or two or three methods how one, we can ask some questions to the patient.

So, based on the signs and symptoms, you can understand whether the patient is having or suffering from hypothyroidism, or hyperthyroidism. The second part is you can ask that medication history what drug the patients take a patient do not know what rubber they use a list of drugs. So, if you see the drugs, you can understand whether the patient's taking medication for hypothyroidism or hyperthyroidism and of course, confirmatory by blood tests.

So, you can identify these patients based on the signs and symptoms, based on the medications what they take, and based on the blood tests and the thyroid function tests. Now, let us see what are the features associated with hyperthyroidism, if you want to know based on the signs and symptom, you should be able to ask the patient or elicit these things.

So, hypothyroidism patient what are the signs and symptoms? They have intolerance to cold because thyroid hormones are very much essential for increasing the cardiac output and Hyperdynamic situation. The blood flow is always on the high the heart is always functioning Fast, Fast, Fast. So, are we there is a continuous blood flow in patient with hyperthyroidism.

So, in hypothyroidism, what happens there is a reduced supply of the blood, there is a reduced secretion of the hormones. So, peripheral vasculature everything and overall will be very cold, there be actually a patient have in turn tolerate cold because they do not have adequate calories production, this actually the energy required for these patients in increased metabolic demands is actually by virtue of the caloric metabolism the caloric has to be produced.

So, when there is, no calories produced, what happens the body does not have adequate energy to bear this stress. So, intolerance is too cold is because of these hypothyroidism, there is reduced amount of thyroid secretions. So, there is a reduced amount of calorigenic effect and the patient can bear the cold so intolerance cold is because of that. Increased appetite what happens now in these hyperthyroidism, patients, the metabolism of the thing is also affected.

So, they actually feels a little bit of always they feel like eating more and more, because there is the whatever the food is being taken, is not being dissipated to energy. It is not being broken down the energy because there is no calorigenic effect. So, the ill effects of the food and the, whatever eaten remains in the system.

So, energy is not being produced from that. So, what happens for energy, then you have a mechanism, an urge, a feeling of, a hunger comes automatically because the source of energy for the body is from the food. So, when the energy requirement is not happening, the body has got a tendency to eat more and looking out for more energy.

That is why these patients have got increase appetite. Weight gain why because all the food what you eat is not being broken down; there is no colorigenic effect, they are not being utilized for

energy or the usual food in normal individuals, the intake is has been used for energy breakdown and excretion.

So, what happens, there is no collection, there is no settling, whereas in hypothyroidism, there is not much of a calorigenic effect, there is no much of breaking up there is no much of utilization of the food. So, what happens whatever ill effects happens and patient get tends to gain weight, they put on weight. Memory issues I told you thyroid is very essential for normal brain growth and development and all the connecting activity.

So, whenever patients having a hypothyroidism they have a tendency to have, short term memory, retention loss, memory issues, et cetera. Lethargy and fatigue, they always because I have told you, they do not have a good system of energy producing or calorigenic effect is not there whenever there is a reduced thyroid. So, when energy is not there, they will feel lethargic and fatigue, always. Hypotension and Giddiness why I told you, whenever there is a reduced amount of thyroid.

There is a reduced amount of stimulation of the heart, there is a reduced amount of force of contraction, there is reduced cardiac output, there is reduced stroke volume, center (())(16:32), the circulating volume of the blood and the pressure is also becoming less, so Hypotension, whenever there is hypotension and whenever there is no adequate blood reaching this, the brain and other vital structures you feel giddy.

So, that is the reason for Hypotension in this hypothyroidism, patient. Constipation, thyroid hormones are essentially required for your motility, the gastric motility. So, whenever there is a reduction on the thyroid hormone, there is a stress is there a decreased gastric motility and that is why in hypothyroid patients you will find this constipation as one of the complaints. Dry skin again dehydration happens and there is not adequate amount of nutrition reaching the skin surface so you feel they get this dry skin appearance.

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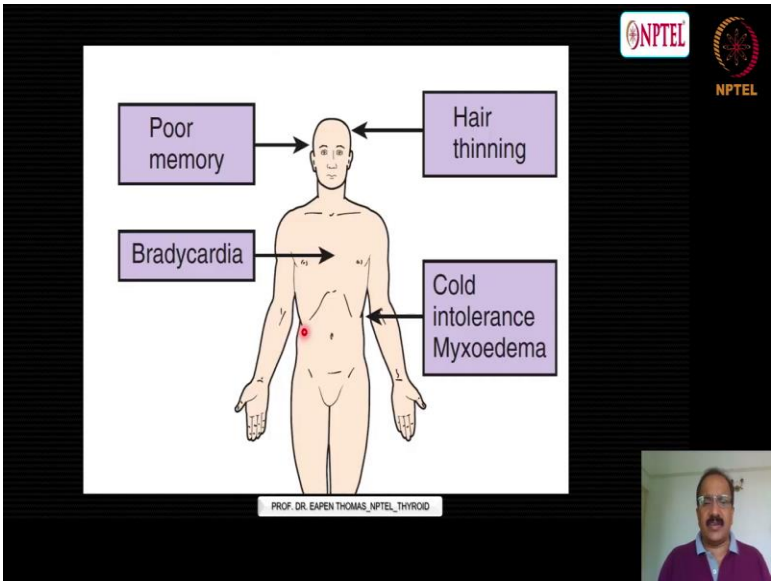

So, these are the basic signs and symptoms of patients with hypothyroid is basically a nutshell poor memory. I have told you the reason why poor memory because brain growth is less hair thinning because hair follicles are weak and they do not get retained. And there is not adequate nutrition they are Cold Intolerance and Myxoedema totally because there is no calorigenic effect and Bradycardia because of the inhibitory effect on the heart, or there is no stimulation on the heart. So, they are in nutshell the features of hypothyroidism.

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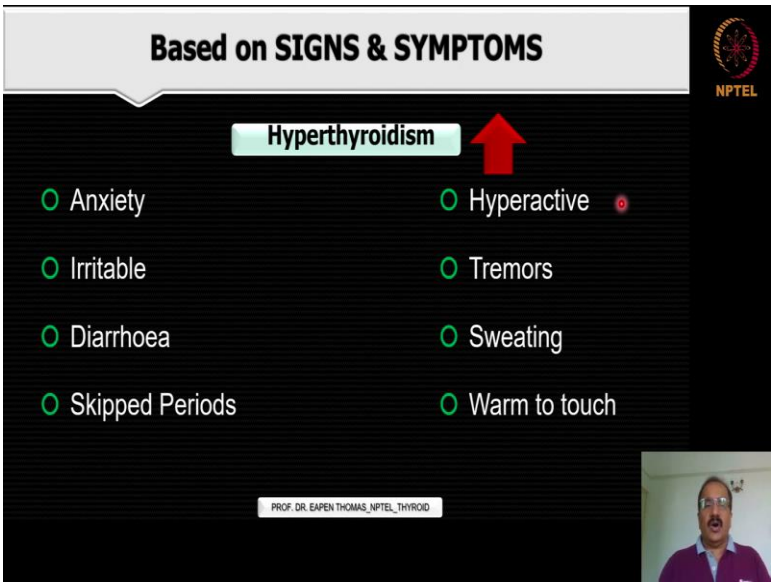

Now, let us see what are the signs and symptoms of hyperthyroidism. It is opposites that this excess creations of thyroid hormones. Anxiety because they always have this hyperness, the access of hormones are secreted in the blood and always hyper anxiety situation. The Metaverse is very high and the heart is always, increase circulation, circulating volume is increasing the pressure is increasing the force of contraction increasing.

So, all these give rise to and the mental state is always irritable, the brain feels it always irritated. And this hyperactivity and hyper metabolism leads to all these situations. Diarrhoea, because I have told you the hyperthyroidism there is a decreased gastric motility but hyperthyroidism, there is an increase gastric motility, and that is the cause for the diarrhea.

Skipped the periods again, associated with other hormonal imbalances. They always tend to be more hyperactive, because I have told they always are, they are sympathetic active always high. And these almost always, always stimulatory to the heart and always in a visual state. And they will be more, hyper than a normal individual.

Tremors because the fine Tremors happen because of the excess stimulation on the neurogenic substances because of the excess metabolic activity and that is the reason why you get these tumors and because excitation of this nerves in the peripheral thing.

And sweating again, because of the excessive sympathetic activity associated with increased thyroid secretions, they are always wanted because always blood circulation is always on the rise on the high so wherever they feel, you know, they feel very warm to touch. Now these are the signs and symptoms of hyperthyroidism because of the excess thyroid secretions.

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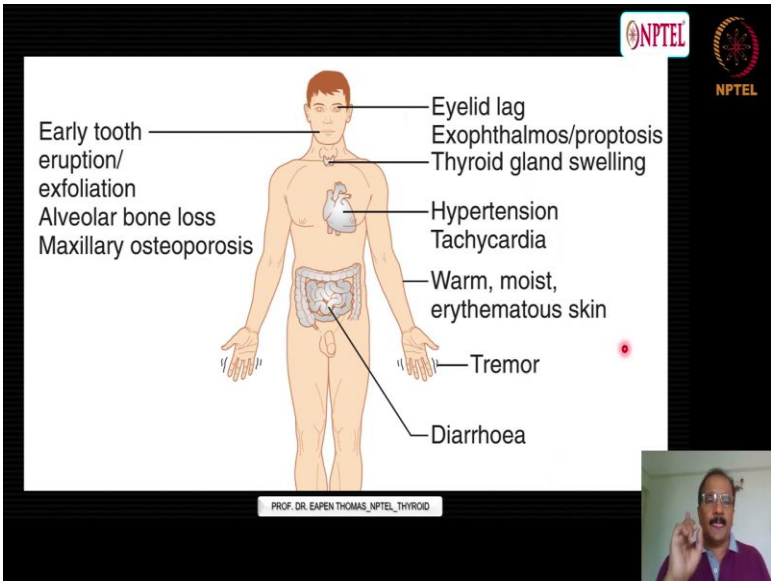

There is in nutshell basically about hyperthyroidism. All these features hypertension because Tachycardia because they have always cardiac stimulant. So, access the thyroid always stimulates the heart and always sensitizes the myocardium to the effects of retina and also so all these are the reasons why you get these signs and symptoms in patients with hyperthyroidism.

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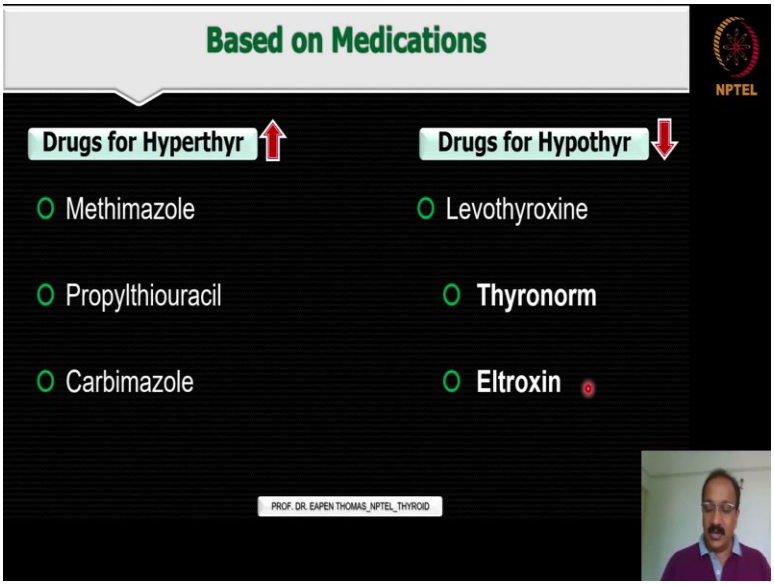

Now based on medication now we have understood based on the signs and symptoms, how do you identify a hyperthyroid from a hypothyroid. Now let us see what other medications are based

on the medication. How do you identify a patient whether it is hypothyroid or hyperthyroid? Remember all drugs for hyperthyroidism.

They will fall into any of these three categories. They will have a combination of Methimazole, Propylthiouracil, Carbimazole used either individually or in combinations. So, any drug preparations that the patient brings to you with any of these names like Methimazole, Propylthiouracil, Carbimazole, you should actually understand that patient is a hyperthyroid patient.

Similarly, how to look for a hypothyroid patients. Now all the drug preparations are basically synthetic forms of thyroxin patient who have hypothyroid will always have the synthetic tyrosine supplements. Mainly it is all about preparations of Levothyroxine, Levothyroxine is a pharmacology ingredient a synthetic substitute of the cell called thyroxin.

And that is a hormone which is actually condenses in this Tyronorm, Eltroxin and other preparations. So, if the patient is taking these preparations on your, that is Tyronorm Eltroxin. You should consider them as hyperthyroid. The patient's taking any of these on your left Methimazole, Propylthiouracil, Carbimazole, cancel that patient's hyperthyroid. That is Identify based on the medications.

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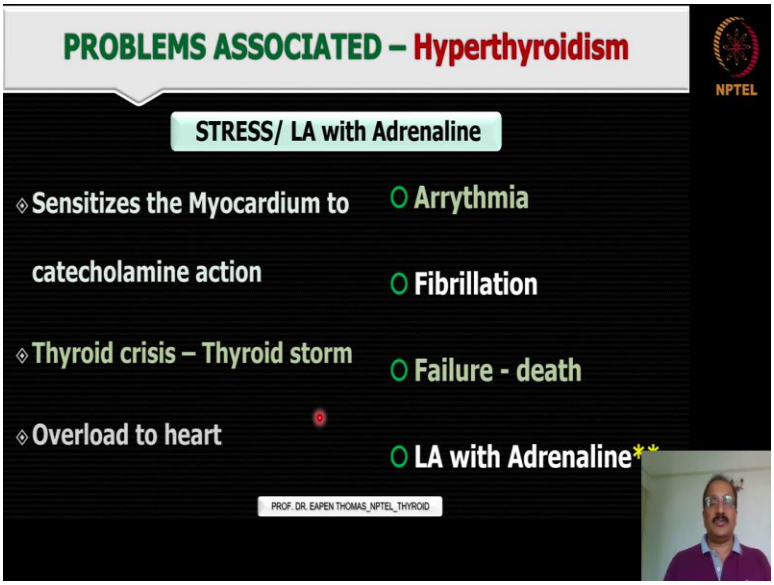

Now, let us see what are the problems associated with Hyperthyroidism. Because whatever procedures we do, we create stress, is int it? And we also give LA with Adrenaline. So, these are two very essential or very harmful things for the patients with hyperthyroidism. How and what let us see, whenever there is stress, there is large amount of Adernaline and Noradrenaline or the catecholamines being released in a circulations.

Catecholamines already have a stimulatory effect on the heart. So, these hyperthyroid patients, what happens the thyroxin sensitizes, the myocardium to the effect of catecholamines, so they have added effect on the heart. So, in hyperthyroid patient, their heart is already functioning our time to meet this increased demand because of the increased metabolic activity.

And on top of that Adrenaline is going to again stimulate the heart making situation worse, what we call it as Thyroid crisis or Thyroid storm exacerbation of hyperthyroid situations, the thyroid crisis or the thyroid storm overload to the heart happens I have told you because they have already having an excess workload on top of that.

Whenever the stress induces more load, the heart I know undergoes a lot of excess stress and then it leads to Arrythmia as well in which a rate goes beyond the normal thing and after a long period of a continuous stress, then it goes into fibrillation and the finally patient go for a cardiac failure and death is the end result.

Remember whenever using LA with Adrenaline, this Adrenaline can create trouble I told you it stimulated to heart so if the patient is hyperthyroid an if using LA with Adrenaline we should be very careful because Adrenaline can versus further stimulatory effect on these patients and a hyperthyroid patient can develop a thyroid storm or the thyroid crisis remember that so these are things that you should consider the problems associated with hyperthyroidism.

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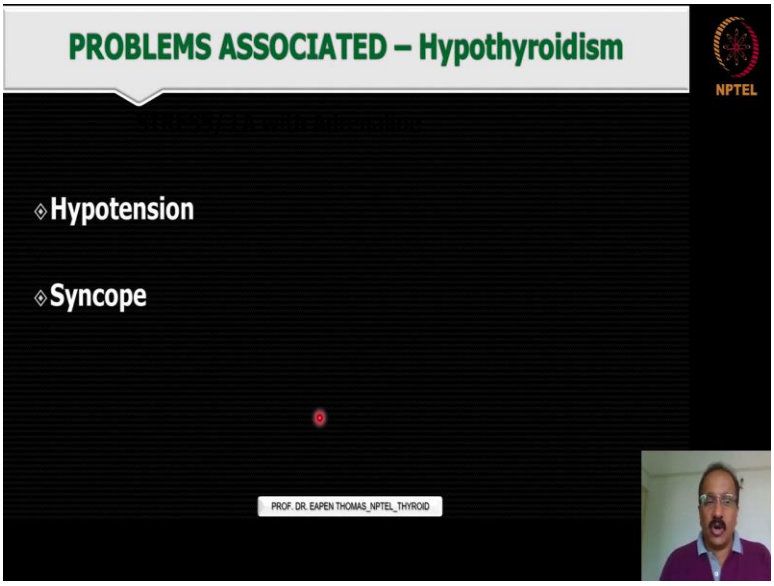

Let us see what are the problems associated hypothyroid. Now hypothyroidism as such do not have any direct issues or problems with us. Because they actually have the only problem is they do, people with hypothyroidism are more prone hypotension because the circulatory volume is less, overall hyportension situation is there, cardiac is less, stroke volume force of contraction everything is there, so they have hyportension, so the brain is vulnerable to hypoxia and they are more prone for Syncope.

So, these are the only main situation what we are worried about hyperthyroidism, other ways hypothyroidism do not actually poses at any problem.

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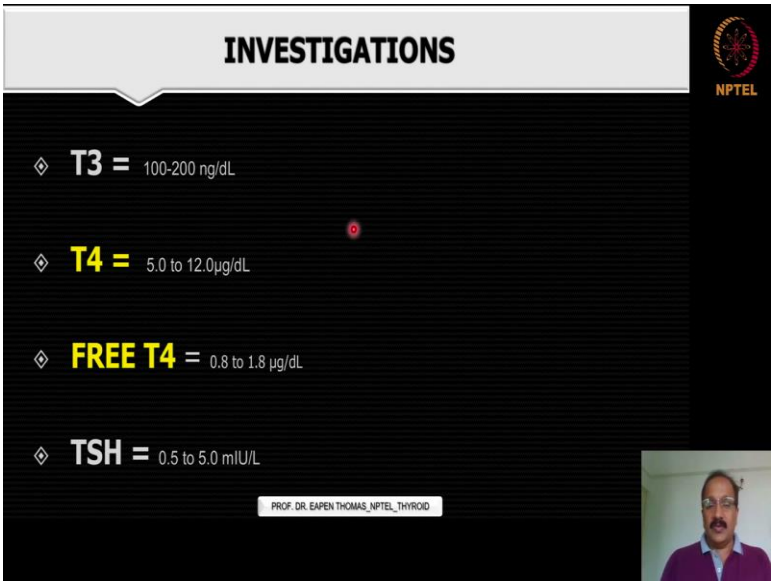

Based on the test, how do you or investigation how do you identify this particular patient with hyperthyroid? Now you have to look for patients values man what are values you look for, one is T3 to triiodothyronine, the normal values between 100-200 nanograms per deciliter, T4 value is 5 to 12 nanograms or micrograms per deciliter and Free T4 values 0.8 to 1.8 micrograms per deciliter.

Now if the values are more than this, blood test values shows more than this, the patient has to be diagnosed as a hyperthyroidism patient. If the values are lesser than these, then it is called as hypothyroidism, that is what I was talking about earlier, third method of diagnosing the patient whether it is a hypothyroid or a hyperthyroid.

TSH value, also has to be checked in this patient, the thyroid function testing includes all these three. Remember it our situations, whenever we send these patients for cardiological or physiologic or a physician's concern, they just take the TSH value or the thyroid function test and there is give us a fitness but remember, we are more worried about this T3 and T4.

Because these are the hormone which is having a direct effect on the heart and stimulatory effect. So, if the values of these hormones are high, then you better not take up the case. So, that is something which I want to tell you about a message which I would like to tell you.

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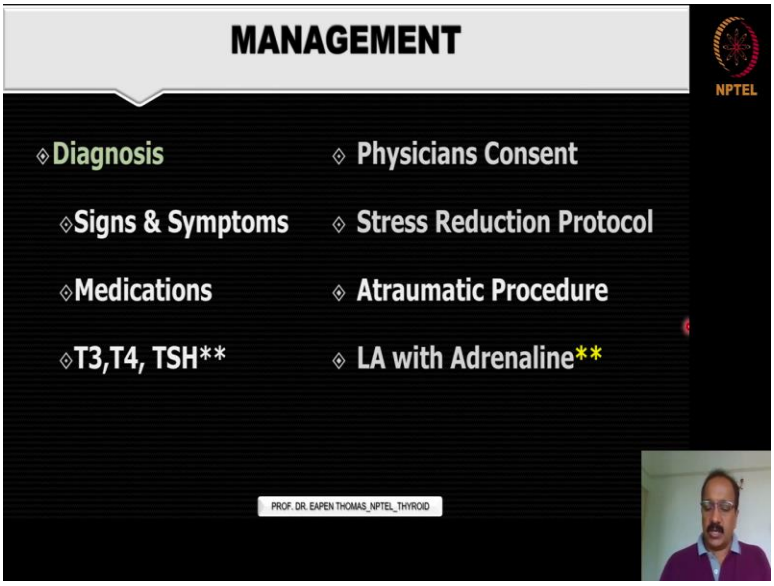

Diagnosis, how would you diagnose? I have told you based on the signs and symptoms based on medications based on the investigation value. So, these are the based on which you have to actually diagnosis particular patient with a thyroid disorders. How do you manage physicians consent is a must.

Even though a physician gives you fitness make sure the patient's T3 T4 values are within normal limits patients actually they do actually the physician they take for this thyroid function test and they actually you take a measure of the TSH. So, TSH value may not be always giving a confirmatory or result regarding what we require what we require is more about the T3 T4 levels.

So, that is actually what is going to create trouble for the heart. So, even though the physician gives the consent make sure that you have a normal T3, T4 test, which you have got convinced based on the test and then only proceed. So, if the value of T3, T4 is high, even if the physician gives the consent, do not proceed with that case that will give you trouble.

So, that is something which I want to put across. Then adopts Stress Reduction Protocol, all the procedures which actually create stress for the patient, it induces secretions of these sympathomimetic agents that is the or the catecholamines and they have we know it actually stimulate the heart. In the hyperthyroid patient, its excess stimulation, patient will go into thyroid crisis and thyroid failure.

So, stress reduction protocols as we adopted both, can either take pharmacological methods or non-pharmacological methods. Pharmacological methods include the use of antibiotics and sedatives and hypnotics and non-pharmacologic methods includes the proper rena mannerisms, proper ODNR (())(26:52) and other mechanisms in the clinical setup.

Do an atraumatic procedure again to create or to reduce amount of stress what is created, procedure has to be done with a general care and gain the patient's confidence, make the patient feel at home, make the patient comfortable and always do the procedure atraumatically. And the local anesthetic with adrenaline should be used with care I have told you, in hyperthyroidism patient as much as produce this adrenaline produce hyperthyroid crisis or thyroid storm.

So, patient with hyperthyroidism, it is always best to use a plane LA. Or if at all you are using at adernaline, make sure you are using adrenaline in the concentration of one is to two lac, that means the maximum dilution adrenaline, which can create trouble. So, if you are using LA with one is two lac at Adrenaline, and with the careful aspiration injection your procedure a save.

But always remember never take a case of hyperthyroidism where the values are beyond normal, I mean T3, T4 values, if it is abnormal, do not treat under clinical setup. You can refer the patient to a hospital setup, where they can be managed in a better way. Hypothyroidism patient is not at all a concern for us.

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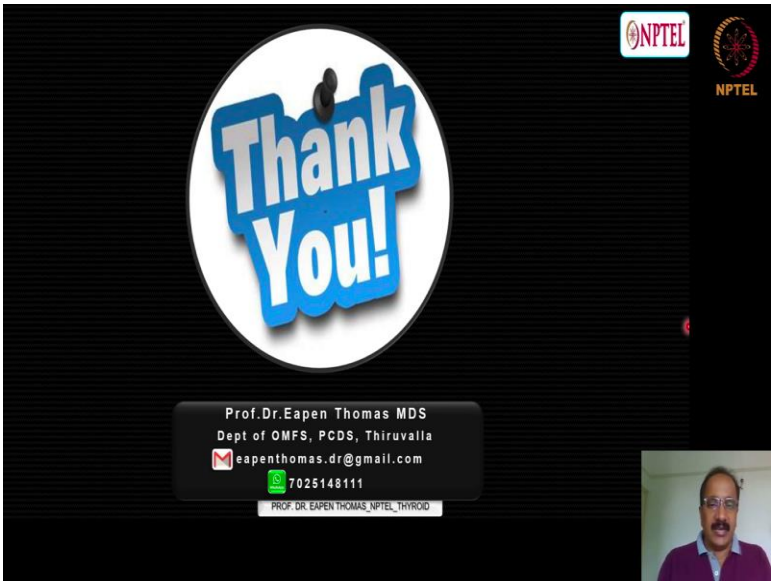

With that, we come to the end of the session on hyper or hypothyroid diseases. And thank you for listening. I hope it is clear, now we have actually discussed basically about the thyroid gland. It is hormones, the functions, it effects on the various systems. What are the disorders of thyroid? How to identify a hypothyroid patients from hyperthyroid patients, based on the medication, based on the signs and symptoms, based on investigations?

And once you know the patient, how do you manage this particular patient in your clinic, based on the values, what are the preventive measures or the protective measures that you should take? So, remember these measures and next time when you come across a patient do use this information and treat the patient very well. And thank you, for your patient listening.