Mirjana Doknić¹

NEDOSTATAK HORMONA RASTA I ZNAČAJ NJEGOVE NADOKNADE U PERIODU TRANZICIJE – OD KASNE ADOLESCENCIJE DO ODRASLOG DOBA

Smernice za prelazak pacijenata sa NHR od pedijatra endokrinologa do interniste endokrinologa

Sažetak: Period tranzicije (TP) je razdoblje života koje traje nekoliko godina nakon postizanja finalne telesne visine, u rasponu od 16. do 26. godine života. U ovom periodu se postiže maksimum u mišićnoj masi i gustini kostiju jedinke. Nedostatak hormona rasta (NHR) u periodu tranzicije vodi redukciji gustine kostiju i neadekvatnom telesnom sastavu sa posledičnim smanjenjem mišićne mase i povećanjem abdominalnog masnog tkiva. Takođe se kod pacijenata sa NHR u tranziciji pogoršava lipidni profil, povećava insulinska rezistencija sa rizikom od nastanka metaboličkog sindroma. Nadoknada HR tokom TP ima povoljan učinak na gustinu i kvalitet kosti, telesni sastav i kardiovaskularni aparat, čime se smanjuje morbiditet i mortalitet ovih osoba u odraslom dobu. Posebno važnu ulogu HR ima na poboljšanje kvaliteta života mladih ljudi.

Da bi pacijenti lečeni tokom detinjstva hormonom rasta nastavili ovu terapiju i nakon završetka rasta, kreirali smo smernice koje pomažu boljoj komunikaciji dečjeg i „odraslog” endokrinologa. Bliža saradnja ove dve specijalnosti olakšava pacijentima lakši nastavak lečenja hipopituitarizma u odraslom dobu. Smernice koje su prezentovane u ovom radu imaju za cilj da se spreči odustajanje pacijenata u periodu tranzicije od nastavka supstitucije hormonom rasta i drugih nedostajućih hormona.

Cljučne reči: nedostatak hormona rasta, period tranzicije, smernice

Uvod

Period tranzicije (TP) predstavlja period u životu jedinke od kasne adolescencije do postizanja potpunog fizičkog i psihosocijalnog sazrevanjem u odraslu osobu. Ovo

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razdoblje života traje nekoliko godina nakon završetka rasta, u rasponu od 16. do 26. godine života.¹ Zbog telesnih, metaboličkih, psiholoških i socijalnih specifičnosti koje generalno prate prelazak od kasnog puberteta u odraslo doba, kod mladih sa nedostatkom hormona rasta (NHR) potrebna je posebna pažnja i saradnja između endokrinologa pedijatra i endokrinologa interniste. Kod osoba koje su tokom detinjstva imale NHR, neophodno je razmotriti potrebu za nastavkom ove terapije.²

Postizanje zadovoljavajuće telesne visine je samo preduslov za postizanje normalnog telesnog sastava. Ranije se terapija hormonom rasta ukidala kada pacijent završi rast i postigne finalnu telesnu visinu. Međutim, upravo je TP kada se postiže maksimum u mišićnoj masi i gustini kostiju. Smatra se da se kost izgrađuje sve do 30. godine života. Kada u TP nedostaje hormon rasta (HR) dolazi do nemogućnosti postizanja maksimalne gustine kostiju i neadekvatnog telesnog sastava na račun redukcije mišićne mase i povećanja abdominalnog masnog tkiva.³ Takođe se pogoršava lipidni profil sa rizikom od metaboličkog sindroma. Zbog toga, posle perioda detinjstva, hormon rasta najvažniju ulogu ima baš u periodu tranzicije. Njegova supstitucija tokom TP ima povoljan učinak na kost, telesni sastav i kardiovaskularni aparat, čime se smanjuje morbiditet i mortalitet ovih osoba u odraslom dobu.⁴ Evidentno je poboljšanje kvaliteta života tokom terapije HR u ovom osetljivom psihosocijalnom periodu jedinke.

Kada pedijatar endokrinolog proceni da je pacijent završio rast pristupa se retestiranju kod interniste endokrinologa.⁵ Preporuka je da se pre retestiranja obustavi terapija hormonom rasta na 1-3 meseca. Jedna trećina pacijenata sa izolovanim idiopatskim NHR u detinjstvu u tranziciji oporavi osovину HR. Ako je uzrok deficita hormona rasta organski razlog (endokranijalni tumori), strukturne anomalije hipotalamusa i hipofize ili dokazana genetska mutacija (transkripcioni faktori uključeni u razvoj hipofizne regije), deficit HR perzistira (Slika 1). U tim slučajevima obično postoji deficit svih hormona adenohipofize (ACTH, TSH, FSH/LH) pa se ne sprovede provokacioni testovi, već je nizak IGF1 dovoljan za dijagnozu NHR.^{2,5} Kod ostalih pacijenata se uz merenje IGF1 savetuje retestiranje sa jednim ili dva stimulaciona testa. Stimulacioni testovi koji se kod nas sprovedu u tranziciji su ITT (test insulinske tolerancije) i glukagonski test. Vrednost maksimalnog odgovora $HR < 5.1 \mu\text{g/l}$ u ovim testovima, indikativna je za deficit hormona rasta. Pošto se pacijenti u TP nalaze na prelazu između detinjstva i odraslog doba i doze HR treba da budu između vrednosti za ova dva perioda života. Počinje se sa manjim dozama 0.3–0.5 mg/dan, pa se zatim doza titrira prema IGF1 i kliničkom odgovoru, retko prelazi 1,6 mg/dan. Doza se individualno određuje za svakog pacijenta, cilj je da IGF1 bude u sredini normalnog opsega za godine starosti.^{5,7}

Praćenje terapije hormonom rasta tokom TP podrazumeva šestomesečne kontrole (telesna težina, telesna visina, obim kuka i struka, merenje krvnog pritiska, glikemija, HbA1c, lipidnog profila), godišnje određivanje kvaliteta života pomoću adekvatnog upitnika (AGHDA-QoL) i merenje nivoa tiroidnih hormona i kortizola. Evaluaciju

telesnog sastava metodom DXA i gustine kostiju potrebno je sprovesti bazno i svakih 2–5 godina terapije.²

Shema za retestiranje pacijenata sa nedostatkom hormona rasta u periodu tranzicije⁶

Smernice za prelazak pacijenata sa NHR od pedijatra endokrinologa do interniste endokrinologa

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Lečenje pacijenata sa nedostatkom hormona rasta (NHR) u periodu tranzicije još uvek je izazov za pedijatre endokrinologe i „odrasle” endokrinologe, pa je saradnja ove dve specijalnosti ključ uspeha za lečenje ovih osoba do postizanja njihove pune psihofizičke zrelosti u odraslu osobu.

Pacijent u periodu tranzicije nema potpunu predstavu šta ga očekuje na endokrinološkim odeljenjima klinika za odrasle. On je najčešće preplašen budući da napušta pedijatra endokrinologa, koji ga je godinama lečio, a treba da nastavi lečenje kod novog, njemu nepoznatog doktora. Zbog toga su prve posete internisti endokrinologu

veoma bitne za „razbijanje” tog straha, pa je bliska komunikacija sa pacijentom od presudne važnosti za njegovo dalje lečenje. Na osnovu sada već petnaestogodišnjeg iskustva na polju tranzicije kod osoba sa NHR u Srbiji, kreirali smo smernice prema kojima bi se rukovodili kako sami pacijenti, tako i nadležni endokrinolozi – pedijatri i internisti. Na taj način bi se poboljšala saradnja pedijatar endokrinologa i „odraslih” endokrinologa i time smanjio broj pacijenata koji odustaju od daljeg lečenja hipopituitarizma u periodu tranzicije. Smernice smo adaptirali prema algoritmu koji predlaže *Endocrine Society* (www.endocrinetransitions.org), za pristup pacijentu prilikom prelaska iz pedijatrijske u ustanovu za lečenje odraslih sa GHD.

Smernice za prelazak pacijenta sa nedostatkom hormona rasta iz dečje u „odraslu” endokrinologiju sadrže 3 formulara: 1) Informacije za pacijenta i njegove roditelje, 2) Klinički podaci o pacijentu (popunjava pedijatar endokrinolog i šalje internisti endokrinologu), 3) Klinički podaci o pacijentu nakon evaluacije (popunjava internista endokrinolog i šalje pedijatru endokrinologu koji mu je uputio pacijenta).

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1) Informacije za pacijenta i njegove roditelje

IME I KONTAKT NADLEŽNOG INTERNISTE ENDOKRINOLOGA**:

Adresa ustanove:

tel:

mob:

e-mail:

**Svaki pedijatar endokrinolog bi naveo kontakt interniste endokrinologa kome on šalje pacijenta u tranziciji.

1. Prvi susret sa internistom endokrinologom najbolje zakazati putem mobilnog telefona ili e-mail.
2. Na prvi susret sa internistom endokrinologom doći sa roditeljima, poneti medicinsku dokumentaciju (otpusne liste i izveštaji pedijatra) i snimke magnetne resonance (MR). Tada poneti uput za pregled interniste endokrinologa, dobijen od nadležnog lekara iz Doma zdravlja. Na tom susretu internista endokrinolog će pacijentu i njegovim roditeljima detaljno objasniti sve o razlozima nastavka hormonske terapije, kao i o rizicima koje nosi prekid ove terapije. Internista endokrinolog je dužan da odgovori i na sva pitanja koje postavi pacijent i njegovi roditelji u vezi sa bolešću i terapijom. Razgovaraće se o tome šta može da očekuje tokom lečenja u bližoj i daljoj budućnosti.
3. Ispitivanje hormonskog i metaboličkog stanja se ispituje tokom 3–5 dana u bolničkim uslovima na odeljenju „odrasle” endokrinologije. Tada poneti uput za hospitalizaciju, dobijen od nadležnog lekara iz Doma zdravlja. Tokom tog perioda se sprovode:
  - Testovi za procenu sekrecije hipofize (obično dva testa)
  - DXA – snimanje gustine kostiju i telesnog sastava
  - Ultrazvuk abdomena i vrata
  - Radiografija pluća i kranioigram
  - Radiografija šake (procena da li je rast završen)
  - Upitnik za kvalitet života

Ako pacijent ima prenočište u gradu gde se ispitivanje vrši (Beograd, Niš, Novi Sad, Kragujevac), nije u obavezi da leži na odeljenju, već da 3–5 jutara zaredom dolazi na kliniku u prepodnevним časovima (do 12h). Kada se pretrage završe, pacijent je slobodan do sledećeg jutra. Ako se odluči za ovu opciju (Dnevna bolnica), takođe je potreban uput za hospitalizaciju.

4. Pacijent se otpušta sa zakazanim terminom kontrole (obično za mesec dana), kada će biti gotovi rezultati testova.
5. Na osnovu rezultata testova, donosi se odluka o daljem lečenju pacijenta. Najveći broj pacijenata nastavlja terapiju koju je dobijao od pedijatra endokrinologa. Doze hormona rasta u odraslom periodu su značajno niže u odnosu na pedijatrijski uzrast (0.3–1.0 mg). Jedan broj pacijenata oporavi funkciju hipofize, pa nije potrebna dalja hormonska terapija. To su obično pacijenti sa izolovanim nedostatkom hormona rasta.
6. Ako se nastavi redovna hormonska terapija, kontrole kod interniste endokrinologa su obično na 6 meseci. Testovi se više ne sprovode.
7. Šestomesečne kontrole se dogovaraju sa internistom endokrinologom. Tada se proverava hormonski status – jedno uzimanje krvi (u mestu stanovanja pacijenta ili na Klinici za endokrinologiju, prema dogovoru). Za praćenje efikasnosti i doze hormona rasta meri se nivo IGF1.
8. Pacijent se upoznaje sa medicinskom sestrom na odeljenju, koja je zadužena za obuku i praćenje primene hormona rasta (ako se ta terapija nastavlja).
9. Pacijent i njegovi roditelji treba da budu upoznati sa terapijom koju on prima, dozama lekova i postupcima u slučaju posebnih situacija (telesna temperature preko 38C, povraćanje/proliv, operacije, infekcije, gubitak svesti, udesi). Oni moraju biti edukovani o primeni visokih doza hidrokortizona u takvim hitnim stanjima. Takođe, moraju biti upoznati o lokaciji najbližeg urgentnog centra ili stanice hitne pomoći kojima će se javiti u hitnim slučajevima.
10. Ako je pacijent na terapiji hidrokortizonom, potrebno je da nosi sa sobom karticu o tome (dobija je od nadležnog interniste endokrinologa), da bi u slučaju hitnih situacija (infekcije, gubitak svesti, operacije, udesi) dobio hidrokortizon ODMAH intravenski u većim dozama.

Testovi sekretorne rezerve hipofize: datum testa, vrsta testa, max odgovor **hormona rasta**, početni i max odgovor **kortizola** _____

Komorbiditeti: Da ☐ Ne ☐

_____
MRI selarne regije i endokranijuma: Datum snimanja: Opis:

_____
Radiografija šake (koštana starost merena pre prelaska kod interniste endokrinologa):

Datum: Opis:

_____
Datum: Potpis pedijatra endokrinologa

3) Klinički podaci o pacijentu sa NHR tokom detinjstva – nakon evaluacije kod interniste endokrinologa

(popunjava internista endokrinolog i šalje pedijatru endokrinologu,
koji mu je uputio pacijenta)

Nakon tri meseca od prijema u tercijarnu endokrinološku ustanovu, gde je pacijent evaluiran, internista endokrinolog obaveštava pedijatra endokrinologa o sledećem:

1. Da li je pacijent adekvatno evaluiran Da ☐ Ne ☐
2. Da li je potvrđen deficit hormona rasta i ostalih hormona adenohipofize Da ☐ Ne ☐
3. Da li je urađen kontrolni ili prvi MR selarne regije i kakav je opis Da ☐ Ne ☐

4. Da li je urađena DXA (gustina kostiju i telesni sastav) i kakav je rezultat Da ☐ Ne ☐

5. Da li je pacijent psihološki dobro podneo prelazak od pedijatra ka endokrinologu Da ☐ Ne ☐
6. Da li se pacijent zaposlio ili nastavio školovanje Da ☐ Ne ☐

7. Kakav je emotivni status pacijenta i interesovanje za potomstvo

Datum:

Potpis interniste endokrinologa

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GROWTH HORMONE DEFICIENCY (GHD) AND THE IMPORTANCE OF GROWTH HORMONE REPLACEMENT IN TRANSITION FROM LATE ADOLESCENCE TO ADULTHOOD

Guidelines for patients with GHD in transition from pediatric to adult endocrinologist

Abstract: Transitional period (TP) is the time of several years in a person's life after reaching of final body height, spanning from about the age of 16 to about the age of 26 years. In this period the person reaches a peak in muscle mass and bone mineral density. Growth hormone deficiency (GHD) in the TP leads to reduced bone mineral density and inadequate body composition with reduced muscle mass and increased abdominal fat mass. GHD in TP is also associated with impaired lipid profile, increased insulin resistance and risk for metabolic syndrome. GH replacement during TP has a favorable effect on bone density and quality, on body composition and on cardiovascular health, thus reducing future morbidity and mortality in adulthood. GH replacement is of particular importance for quality of life improvement in the young patients.

To facilitate and optimize the continuance of GH replacement in the TP for the patients treated with GH in childhood, we have comprised these guidelines aimed to improve the communication between pediatric and adult endocrinologists. A closer collaboration between these two services would ensure easier continuance of treatment and follow up for the patients with hypopituitarism in transition to adulthood. The goal of presenting these guidelines is to prevent the drop out of patients with GHD in TP from continuing GH replacement and other relevant hormonal replacement.

Key words: growth hormone deficiency, transitional period, guidelines

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Introduction

Transitional period (TP) in a person's life represents the time from late adolescence until the reaching of full physical and psychosocial maturation into an adult person. This period lasts for several years after the termination of linear growth in height, spanning from the age of 16 to the age of 26 years.¹ Due to physical, metabolic, psychological and social specificities commonly related to the transition from late puberty to adulthood, in the young patients with growth hormone deficiency (GHD) a particular attention needs to be paid to the collaboration between pediatric endocrinologist and "adult" internist endocrinologist. In the patients treated for GHD in childhood, continuance of treatment needs to be reassessed.²

Reaching of sufficient body height is only a prerequisite for acquisition of normal body composition. In the past, GH replacement was discontinued when the patient stopped growing and reached the final body height. However, the TP is in fact the period when a peak in muscle mass and bone mineral density is yet to be reached. Development of bone is believed to continue as far as to the age of 30 years. GH deficit in TP results in failure to reach maximal bone mineral density potential and leads to inadequate body composition with reduced muscle mass and increased abdominal fat mass³. Lipid profile is also impaired leading to increased risk of metabolic syndrome. Thus the second most important period of GH action, next to its crucial role in childhood, is in fact in the TP. GH replacement in TP has a favourable effect on bone, body composition and cardiovascular health, leading to reduction of future morbidity and mortality in adulthood⁴. An improvement of quality of life was documented during GH replacement in this psychosocially vulnerable period of a person's life.

When a pediatric endocrinologist concludes that the patient has finalised growth in height, a GH axis reassessment by an adult endocrinologist should follow⁵. It is recommended that prior to retesting GH replacement should be discontinued for 1 to 3 months. One third of patients which have an isolated idiopathic GHD in childhood may recover their GH axis in TP. If the cause of GHD is structural (endocranial tumors, hypothalamic anomalies) or a confirmed genetic mutation (involving transcriptional factors for pituitary region development) then GHD is expected to persist (Figure 1). In such patients, there is usually a complete anterior pituitary hormonal deficiency (affecting ACTH, TSH, FSH/LH) and GH stimulation tests might be unnecessary in the presence of reduced IGF-1 which is sufficient for diagnosing GHD^{2,5}. In other patients, along with IGF-1 assessment, retesting of GH axis with one or two GH stimulation tests is advised. In TP patients we use ITT (insulin tolerance test) and glucagon test. Peak response of GH < 5.1 µg/l in these tests is indicative of GHD. Since TP patients are in the transition from childhood to adulthood, GH replacement doses should be targeted between the recommended doses for these two age groups. Replacement is initiated with lower daily doses (0.3 -0.5 mg/d GH) and the dose is further titrated

according to serum IGF-1 values and clinical response to treatment, but rarely exceeds 1.6mg/d. GH replacement dose is individually determined for each patient, aiming for IGF-1 in mid normal age specific range^{5,7}. Followup of GH replacement during TP should include 6-monthly visits for assessment of body weight and height, waist and hip circumference, blood pressure, fasting glucose, HbA1c and lipid profile, and annual visits to assess quality of life using a specific questionnaire - AGHDA-QoL, and to assess thyroid status and serum cortisol level. Body composition and bone mineral density assessment, by using DXA is necessary at baseline and then every 2 to 5 years².

Algorithm for retesting patients with growth hormone deficiency in the transitional period⁶

Guidelines for GHD patient transition from a pediatric endocrinologist to and internist endocrinologist

Mirjana Doknić^{1,3}, Tatjana Milenković², Vera Zdravković^{3,4}, Maja Jesić^{3,4}, Sladjana Todorović², Katarina Mitrović^{2,4}, Rade Vuković²; Study Group for GH treatment in transitional period*

Treatment of patients with growth hormone deficiency (GHD) in the transitional period remains a challenge for both pediatric endocrinologists and “adult” internist endocrinologists. Collaboration between the two services is the key to success in treatment of this group of patients leading to their achievement of full psycho-physical maturity in adulthood.

A patient in transitional period lacks a clear understanding of what to expect from his future care at an adult endocrine service. He or she is usually intimidated for leaving the care of pediatric endocrinologist who treated him or her for years, and for needing to continue the treatment with a new and unfamiliar doctor. Thus the first visits to an adult endocrinologist are crucial to break these fears and close communication with the patient is essential for his or her future treatment. Based on 15 years of experience in the field of transition of patients with GHD in Serbia, we have devised the guidelines for leading both the patients and the caring endocrinologists – pediatricians and internists. The aim was to improve the collaboration between the pediatric and “adult” endocrinologists, and to reduce the fraction of patients who drop out from further follow up and treatment of hypopituitarism in transitional period. The guidelines were adapted from the algorithm for approach to patient in transition from a pediatric to adult care advised by *Endocrine Society* (www.endocrinetransitions.org).

Guidelines for transition of GHD patients from pediatric to adult endocrinologist care consist of 3 forms: 1) Information for the patients and his or her parents 2) Patient’s clinical data (provided by a pediatric endocrinologist and sent to the internist endocrinologist) 3) Patient’s clinical data after assessment by the adult endocrinologist (provided by the internist endocrinologist and returned to the pediatric endocrinologist who has referred the patient).

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1) Information for the patient and his or her parents

NAME AND CONTACT DETAILS OF THE INTERNIST ENDOCRINOLOGIST IN CHARGE**:

Institutional address:

Phone:

Mobile:

e-mail:

**Pediatric endocrinologist provides the contact of the internist to whom the patients in transition is referred.

1. The first appointment with an internist endocrinologist should be scheduled by mobile phone call or e-mail
2. Patient should attend the first meeting with an internist endocrinologist accompanied by his or her parents. All relevant medical records should be brought (discharge letters and pediatric visit notes, MR images). A referral letter for an outpatient visit to internist endocrinologist must be provided by a primary care physician. At this first appointment, the internist endocrinologist will explain the patient and the parents in detail about the reasons for continuing hormonal treatment, and about the risks of discontinuing this treatment. Internist endocrinologist is obliged to answer all relevant questions posed by the patient or the parents regarding the patient's health condition and treatment. Short term and long term expectations from treatment should be discussed.
3. Hormonal and metabolic investigation is designed through a 3 to 5 day in-hospital stay at an adult endocrine department. A referral letter for in-patient stay must be provided by a primary care physician. During the hospital investigation the following is to be performed:
  - Stimulation tests of pituitary reserve assessment (usually two tests)
  - DXA- bone mineral density and body composition assessment
  - Abdominal and neck ultrasound
  - Chest X-ray and profile craniogram
  - Hand X-ray (to assess the termination of linear growth)
  - Quality of life assessment by questionnaire

If the patients can provide other accommodation in the vicinity of the referral center (Beograd, Niš, Novi Sad, Kragujevac), he needs not stay at the hospital department but must present for 3 to 5 consecutive days at the endocrine department

and be available for the investigation during the morning hours until 12h. In this way patient would be free of commitments in the afternoon until the next morning. This option is also based on the in-hospital referral letter from GP.

4. Patient is discharged with the next appointment scheduled usually within a month to evaluate the results of the performed tests.
5. Based on the test results, a decision is made on the future treatment of the patient. Most patients continue with the treatment initiated by the pediatric endocrinologist. GH replacement doses are much lower for the adults compared to children (0.3-1.0 mg daily). Some patients recover their pituitary function and do not need further hormonal replacement. These are most often patients with isolated GH deficiency.
6. If the replacement hormonal treatment is continuing, the visits to internist endocrinologist are usually scheduled for every 6 months. Stimulation tests are not repeated.
7. Six-monthly appointments are scheduled with the internist endocrinologist. Hormonal status will be analyzed (by a single morning blood sampling, in the patient's city of residence or at the Endocrinology clinic, as arranged. Serum IGF-1 is analyzed to assess efficacy and safety of the current GH replacement dose.
8. Patient is introduced to the delegated departmental endocrine nurse in charge for his or her training for adequate GH self administration, and for further monitoring of correct self administration.
9. Patient and his or her parents must be familiar with the patient's treatment, including doses and procedures in special circumstances (e.g. fever over 38C, vomiting, diarrhea, surgical procedures, infections, loss of consciousness, trauma). Patient's family members must be educated on high dose hydrocortisone administration in such emergencies. They also must be familiar with the nearest ER location or other point of emergency first healthcare contact in order to avoid delay in reacting in the event of emergency.
10. If the patient receives hydrocortisone replacement, he or she needs to always carry an emergency identity card (provided by the internist endocrinologist), assuring that stress doses of i.v. hydrocortisone would be WITHOUT DELAY administered in the event of an emergency (infection, unconsciousness, surgery, trauma).

2) Patient's clinical data on GHD during childhood

(provided by the pediatrician endocrinologist and sent to the internist endocrinologist)

PATIENT'S FULL NAME _____

PATIENT'S DATE OF BIRTH _____

DATE OF DIAGNOSIS OF HYPOPITUITARISM _____

AGE OF DIAGNOSIS OF HYPOPITUITARISM _____

Present condition: _____

Etiology of hormonal deficiency: Congenital ☐ Genetic analysis Yes ☐ No ☐
Tumors ☐

Tumors of H/H region or brain, trauma: Craniopharyngeoma ☐ Medulloblastoma ☐
 Germinoma ☐ Pituitary adenoma ☐
 Astrocytoma ☐ Perinatal trauma ☐
 Rathke's cyst ☐ TBI ☐
 PNET ☐ Vascular lesions ☐
 Other brain tumors ☐

Endocranial tumor treatment: Surgery ☐ Date: _____
 Radiotherapy ☐ Date (start and end date): _____
 Chemotherapy ☐ Date: _____

Number of impaired hormonal axes: Isolated GH deficiency ☐ FSH/LH deficiency ☐
 ACTH deficiency ☐ ADH deficiency ☐
 TSH deficiency ☐

HORMONAL REPLACEMENT (provide current doses prior to the referral to internist endocrinologist):

Growth hormone: When was replacement initiated? _____ Dose: _____

When was replacement discontinued? _____

Hydrocortisone: When was replacement initiated? _____ Dose: _____

L-Thyroxine: When was replacement initiated? _____ Dose: _____

Sex steroids: When was replacement initiated? _____ Dose::

ADH: When was replacement initiated? _____ Dose:

Pituitary reserve tests: test date, type of test, **GH peak value, cortisol peak value:**

Comorbidities: Yes ☐ No ☐

Sellar region or endocranial MRI: Date of imaging: MR finding:

Hand radiography: (bone age determined prior to referral to internist endocrinologist):

Date: Finding:

Date: Signed by referring pediatrician endocrinologist:

**3) Patient's clinical data – after the evaluation
by the internist endocrinologist**

**(provided by the internist endocrinologist and returned
to pediatrician who referred the patient)**

After 3 months since the investigation in the referral endocrinology department, internist endocrinologist informs the pediatric endocrinologist of the following:

Was the patient validly evaluated? Yes ☐ No ☐

1. Has GH deficiency and other anterior pituitary hormones deficiency been confirmed?
Yes ☐ No ☐

2. Was an initial or control sellar region MRI performed and what are the findings?
Yes ☐ No ☐

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3. Was DXA (bone densitometry and body composition) performed and what are the results?
Yes ☐ No ☐

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4. Did the patient psychologically take well the transition from a pediatrician to an adult endocrinologist?
Yes ☐ No ☐

5. Did the patient find a job or continue with his or her education?
Yes ☐ No ☐

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6. What is the emotional status of the patient and motivation for reproduction?

Date:

Signed by the internist endocrinologist

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