GESTATSION QANDLI DIABETDA FETOPLATSENTAR YETISHMOVCHILIK SINDROMI RIVOJLANISHINING XAVF OMILLARI VA PROGNOZLASH MODELLARI

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Annotatsiya

Gestatsion qandli diabet (GQD) homiladorlikning eng keng tarqalgan asoratlaridan biri bo‘lib, glyukozaga tolerantlikning buzilishi bilan tavsiflanadi, u ilk bor homiladorlik davrida aniqlanadi yoki namoyon bo‘ladi hamda 1 yoki 2 tip qandli diabet tashxisi mezonlariga mos kelmaydi. Xalqaro diabet federatsiyasi (IDF) ma’lumotlariga ko‘ra, GQD dunyo bo‘yicha barcha homiladorliklarning taxminan 14 foizini asoratlantiradi, biroq bu ko‘rsatkich qo‘llanilayotgan diagnostik mezonlar, geografik hudud va populyatsiyaning etnik tarkibiga qarab sezilarli darajada farq qiladi: Sharqiy Yevropa mamlakatlarida u 31,5% gacha yetadi, G‘arbiy Yevropada esa taxminan 11% ni tashkil etadi. GQD bilan kasallanishning muttasil oshib borishi, avvalo, reproduktiv yoshdagi ayollar orasida semizlikning global epidemiyasi, fertil kontingentning qarishi, urbanizatsiya, kamharakat turmush tarzi va noto‘g‘ri ovqatlanish bilan bog‘liq . GQDning iqtisodiy yuki sezilarli hisoblanadi: skrining, monitoring, farmakologik va parhez terapiyasi, gospitalizatsiya hamda neonatal parvarish uchun to‘g‘ridan to‘g‘ri xarajatlar bilan bir qatorda, bilvosita xarajatlar — mehnat qobiliyatining pasayishi, absenteizm va onaning hayot sifati yomonlashuvi ham muhim hissa qo‘shadi.

Kalit so‘zlar: gestatsion qandli diabet, fetoplatsentar yetishmovchilik, homila o‘sishining kechikishi, makrosomiya, glikemik nazorat, platsentar disfunksiya.

Kirish

GQDdagi fetoplatsentar yetishmovchilik (FPY) patogenezining markaziy bo‘g‘ini surunkali giperglikemiya va insulinrezistentlik bilan yuzaga keladigan metabolik buzilishlar hisoblanadi. Me’yorda homiladorlik rivojlanib borgani sari platsentar laktogen, estrogenlar va progesteronning kontrinsulyar ta’siri tufayli fiziologik insulinrezistentlik ortib boradi: bu bir vaqtning o‘zida onaning metabolizmini saqlagan holda glyukozaning homilaga yetarli transportini ta’minlaydi. Normoglikemiya me’da osti bezining β-hujayralari kompensator giperplaziyasi va gipertrofiyasi orqali saqlab turiladi. GQDda esa ushbu moslashuv mexanizmlari yetarli bo‘lmay qoladi — barqaror giperglikemiya rivojlanadi va bu “ona–platsenta–homila” tizimida ko‘p bosqichli patologik o‘zgarishlar kaskadini ishga tushiradi [1, 2]. Gestatsion qandli diabetda fetoplatsentar yetishmovchilikning xavf omillari bir-biri bilan bog‘liq bo‘lgan bir necha guruhlarga tizimlashtirish maqsadga muvofiq: onaga oid metabolik va konstitutsional omillar, tomir va gemodinamik buzilishlar, platsentar o‘zgarishlar, demografik va etnik xususiyatlar, shuningdek yatrogen ta’sirlar. Ushbu omillarning yig‘indisi va o‘zaro ta’sirini tushunish GQD bilan har bir homilador ayol uchun individual

xavf profilini shakllantirishda zarur bo‘lib, bu kuzatuv va davolashga differensial yondashuvning asosi hisoblanadi. Homiladorlikdan oldingi tana massasi indeksi (TMI) GQDda homila o‘sishi buzilishlarining eng muhim va klinik jihatdan qulay modifikatsiyalanadigan xavf omillaridan biri hisoblanadi. Umumiy soni 100 000 dan ortiq homilador ayollarni qamrab olgan kohort tadqiqotlar tahlili homiladorlikdan oldingi past TMI (tana vazni yetishmovchiligi, <18,5 kg/m²) SGA va tug‘ilgandagi kam vazn xavfini ishonchli oshirishini, semizlik esa (TMI ≥30 kg/m²) LGA va makrosomiya xavfining ortishi bilan bog‘liqligini ishonchli ko‘rsatdi [1]. Drever va boshqalar tadqiqotida (n=308) SGA chaqaloq tug‘gan ayollarda homiladorlikdan oldingi TMI medianasi ishonchli darajada past bo‘lgan (21,5 ga qarshi 24,4 kg/m²), past TMI mavjud bo‘lganda SGA bola tug‘ilishining mutlaq xavfi esa normal TMIdagi 7,9% ga qarshi 27,3% ni tashkil etgan [1]. E’tiborlisi, bog‘liqlik nolinear xarakterga ega: Liao va boshqalar ma’lumotlariga ko‘ra (n=791), yangi tug‘ilgan chaqaloq tana vazni homiladorlikdan oldingi TMI 27,78 kg/m² chegaraviy qiymatigacha oshib borgan, undan keyin esa TMI yanada ortishi bilan kamayishni boshlagan [1], bu esa, ehtimol, platsentada lipotoksiklik, yallig‘lanish va oksidativ stress kuchayishi natijasida yaqqol semizlikda platsentar disfunksiyaning ortishini aks ettiradi. GQD semizlik va LGA o‘rtasidagi bog‘liqlikda mediator sifatida namoyon bo‘ladi: Kondracki(n=3 229 783) va boshqalar ma’lumotlariga ko‘ra, homiladorlikdan oldingi semizlikning LGAga ta’sirining GQD orqali vositalangan ulushi muddatidan oldin to‘liq yetilgan homiladorliklarda 16% ga yetgan [1].

Materiallar

Diabetik homiladorlikdagi FPY klinik namoyonlari orasida fetal gipertrofik kardiomiopatiya alohida o‘rin egallaydi — bu homila miokardiga fetal giperinsulinemiyaning trofik ta’siri bilan bog‘liq patologik holatdir. Lynch va boshqalar (2020) tomonidan o‘tkazilgan 75 ta homila autopsiyasining retrospektiv tahlilida fetal kardiomiopatiya diabet bilan asoratlangan homiladorliklarning 46,7% ida, nazorat guruhida esa 3,3% ida aniqlangan — nisbiy xavf 14,00 ni tashkil etgan (95% ISH 3,23–60,65) [7]. Tug‘ma yurak nuqsonlari bo‘lgan homilalar chiqarib tashlangandan keyin ham bog‘liqlik saqlanib qolgan: 46,7% ga qarshi 2,0% (NX 23,80; 95% ISH 3,17–178,46) [7]. Kardiomiopatiya asosan qorinchalararo to‘siq gipertrofiyasi bilan tavsiflanadi, bunda chap qorincha chiqish yo‘lining obstruksiyasi ham kuzatilishi mumkin, bu esa homilaning yurak chiqarish hajmi buzilishiga va bachadon ichidagi o‘limga olib kelishi mumkin. Ushbu asorat standart antenatal monitoringda ko‘pincha aniqlanmay qoladi, chunki uni aniqlash uchun maqsadli fetal exokardiografiya talab etiladi.

GQD diagnostikasi 75 g glyukoza bilan o‘tkaziladigan peroral glyukozotolerantlik testi (PGTT) natijalariga asoslanadi. Diabet va homiladorlikni o‘rganish bo‘yicha xalqaro assotsiatsiya (IADPSG) tomonidan 2013-yilda JSST tomonidan qabul qilingan diagnostik chegaralar taklif etilgan: och qoringa glikemiya ≥5,1 mmol/l, yuklamadan 1 soat o‘tgach ≥10,0 mmol/l va/yoki 2 soatdan keyin ≥8,5 mmol/l — kamida bitta patologik ko‘rsatkich aniqlanganda tashxis qo‘yiladi [1]. Mazkur mezonlarning joriy etilishi avvalgi standartlarga nisbatan GQD qayd etilish chastotasining 2–11 barobar oshishiga olib keldi. Skrining barcha ayollar uchun homiladorlikning 24–28 haftalarida tavsiya etiladi, biroq yuqori xavf omillari — yaqqol semizlik, anamnezda GQD mavjudligi, glyukozuriya bo‘lganda I trimestrning o‘zidayoq erta skrining o‘tkazish maqsadga muvofiq hisoblanadi [1].

2016-yilda HOKning Delphi-konsensus ta’rifi qabul qilindi, u biometrik mezonlar bilan bir qatorda platsentar funksiya ko‘rsatkichlarini ham o‘z ichiga oladi: bachadon va kindik arteriyalarining dopplerometrik indekslari, dinamik kuzatuvda homilaning taxminiy massasi (HTM) persentilining 50 kvantildan ortiq pasayishi, shuningdek serebroplatsentar nisbat (SPN) [1]. Erta HOK (32 haftagacha) og‘ir platsentar disfunksiya va gipertenziv

buzilishlar bilan chambarchas bog‘liq bo‘lsa, kechki HOK (32 hafta va undan keyin) qon oqimi buzilishlarining kamroq yaqqol namoyon bo‘lishi bilan tavsiflanadi, bunda o‘tkir gipoksiya xavfi biometrik ko‘rsatkichlar 10-persentildan pastga tushishidan oldin ham yuzaga kelishi mumkin [1]. GQDda aynan normal yoki hatto kattalashgan o‘lchamli homilalardagi kechki HOK platsentar disfunksiyaning eng qiyin diagnostika qilinadigan shakli hisoblanadi, chunki “diabetik akseleratsiya” fenomeni — normal chiziqli parametrlar fonida yog‘ning ortiqcha to‘planishi — standart biometrik tekshiruvda o‘sish buzilishini yashiradi [1].

Chatzakis va boshqalar tadqiqotida (2024) OA PSV ratio bachadon arteriyalari PI va PlGF hamda sFlt-1 darajalarining muhim prediktori bo‘lgan [11], 2025-yilgi tadqiqotda esa GQDdagi SGA guruhida ishonchli darajada oshganligi aniqlangan [3]. OA PSV ratio ni o‘lchash III trimestrdagi standart UTT doirasida texnik jihatdan amalga oshirish mumkin. Biokimyoviy markerlar orasida PlGF va sFlt-1/PlGF nisbati GQDdagi platsentar disfunksiyaga nisbatan isbotlangan prognostik ahamiyatga ega: ularning pasayishi/oshishi FPYning klinik namoyonlaridan bir necha hafta oldin kuzatiladi [11]. Qo‘shimcha diagnostik ma’lumotlarni triglitseridlar (>90-persentil — LGA prediktori), postprandial EYoK, siydik kislotasi, HbA1c va D vitamini beradi [1].

Natijalar

GQDda FPY xavf omillarining alohida va juda dolzarb guruhi yatrogen ta’sirlar — avvalo keng qo‘llaniladigan metformin hisoblanadi. Metformin jigarda birlamchi metabolizmga uchramaydi va sinsitiotrofoblast membranalaridagi transportyorlar bilan bog‘lanish, shuningdek paratsellyulyar diffuziya yo‘li orqali platsentadan o‘tadi [13]. Primatlarda o‘tkazilgan eksperimentda (Bolte va boshqalar, 2024) homiladorlikning 30-kunidan boshlab kuniga ikki marta 10 mg/kg dozada buyurilgan metformin homila to‘qimalarida bioakkumulyatsiyaga uchragan: buyraklarda (o‘rtacha 2,48 mkmol/kg), ichaklarda (0,70 mkmol/kg), jigarda (0,38 mkmol/kg), amniotik suyuqlikda (1,88 mkmol/l) [13]. Metforminning bioakkumulyatsiyasi skelet mushaklari massasining kamayishi (boldir mushagining ko‘ndalang kesim maydoni 57% ga kichikroq), yurak, jigar va retroperitoneal yog‘ massasining kamayishi bilan bog‘liq bo‘lib, umumiy holda HOKni yuzaga keltirgan [13]. Homila buyraklarida nefral dismorfogenez — funksional buyrak yetishmovchiligi belgilarisiz glomerulyar generatsiyalarning dezorganizatsiyasi va kortikal qatlamning kattalashishi aniqlangan [13]. Ushbu ma’lumotlar MiTy klinik tadqiqoti natijalari bilan mos keladi, unda metformin qabul qilgan onalardan tug‘ilgan chaqaloqlarda SGA ishonchli darajada ko‘proq uchragan [13], uzoq muddatli kuzatuvlar esa (MiG, PregMet) bunday bolalarda 4–9 yoshga kelib TMI, bel atrofi va insulinrezistentlikning proksimal belgilari ishonchli darajada yuqori bo‘lishini ko‘rsatgan [13]. Shunday qilib, metforminning “antimakrosomik” effekti metabolik nazorat yaxshilanishini emas, balki homila o‘sishining hujayraviy mexanizmlarini bevosita ingibitsiya qilishini aks ettirishi mumkin, bu esa uzoq muddatli istiqbolda avlodda semizlik va insulinrezistentlikning tezlashgan rivojlanishi bilan namoyon bo‘ladi.

Xulosa

Shunday qilib, gestatsion qandli diabetdagi fetoplatsentar yetishmovchilik sindromi klinik jihatdan geterogen, patogenetik jihatdan murakkab va prognostik ahamiyatga ega holat hisoblanadi, uni samarali olib borish esa rivojlanish mexanizmlarini chuqur tushunish, xavf omillarini aniq stratifikatsiya qilish va zamonaviy diagnostik vositalarni qo‘llashsiz mumkin emas. Mintaqaviy populyatsion xususiyatlarni hisobga olgan holda GQDdagi FPYning ixtisoslashtirilgan prognostik modellarini ishlab chiqish va klinik amaliyotga joriy etish zamonaviy akusherlikning ustuvor vazifasi bo‘lib qolmoqda.

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