



RESEARCH ARTICLE

In vitro fertilization, abortion, and women's health

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ABSTRACT

The curtailing (banning) IVF (in vitro fertilization) was a logical decision made from a bad but clear, decisive definition of what it means to be human. This definition of being human starts from the observation that each human is a unique fusion of a male gamete and a female egg. If we make the assumption that genetics determines humanness, then each zygote is a human and should be granted the rights of humans. Since the balls of cells derived from a zygote but before implantation in the uterus is the primary product of IVF, then IVF should be curtailed. The details of pregnancy are outlined in this article in order to decide when the right to life should be granted to zygotes and embryos. It is proposed that early in pregnancy, up to about week 18-20, no rights should be granted to the fetus and women should be allowed to have an abortion as they wish. After this time, abortions should be restricted to medical conditions associated with the fetus or to preserve the life, health, and fertility of the woman. At 35th week of pregnancy, there should be a ban on abortions, since the fetus can nearly live apart from the mother. This proposal is designed to give the fetus increasing rights as it develops.

Introduction

On February 16, 2024, the Alabama supreme court declared that the frozen blastomeres (a term to be defined later) used in *in vitro fertilization* (IVF) are children and should have the legal rights of children.^{1,2} The justices ruled that the parents could sue the institution that lost (that allowed to die) the blastomeres for death of a minor child. This created quite a media reaction. For example, Waldman⁹ suggests that this ruling could stop research on uterus transplants, a procedure that has already been successful in allowing a woman born without a uterus to successfully have a child through IVF. Also, the ruling would likely halt any experimentation on perfecting culture media to grow the blastomeres⁹, since the scientists that allowed any blastomeres that die during this experiment could be charged with murder. The Southern Baptists passed a resolution that calls "to reaffirm the unconditional value and right to life of every human being, including those in an embryonic stage, and to only utilize reproductive technologies consistent with that affirmation, especially in the number of embryos generated in the I.V.F. process".³ What this means will be discussed below.

The story of curtailing (banning) IVF begins with the debate over abortion. The abortion debate has generated more heat than light and so I wish to shine some light on this whole complex of problems in this essay. One extreme position is that all abortion is wrong. Abortion is murder just as killing a baby or killing a person is murder and must be outlawed and punished. On the other side, abortion is simply an option, the freedom to eliminate an unwanted pregnancy without consequence or constraint. A third position is developing that abortion is part of public health and the reproductive health of women. This avoids the legal and moral aspects of the question, but also avoids the obvious social aspects of abortion. A fetus in the normal course of events becomes a separate individual, a baby, with rights. When and why?

I am an outsider to the question of women health and so, by the estimation of some, I have no right to comment on abortion and women's health. I do not live the question and, as I have been writing this essay, I feel more than limited in my ability to comment on women's reproductive health. Authors with more experience will have to expand and correct what I have written here. I am a man born in 1942, studied to go to medical school as an undergraduate, but decided to go to graduate school in biology, becoming an evolutionary geneticist, instead of a medical doctor. However, I am part of human society and so have an interest in problems that affect half the population. I am a Christian from the Calvinist branch of Christianity and so believe that all of us are a mixture of good and evil. I like the image from C. S. Lewis⁶, that humanity is a traveling group slowed by the requirement to look after the well-fare of all, when compared to the rapid progress possible by individuals. The rapid progress possible by individuals as apposed to a group seems to appeal to authoritarians. The authoritarians can get rid of problems, not by discussing them, but by banning them. On the other hand, I am deeply suspicious of the position of the women's movement that says that abortion is a right without obligations or limits. We need

an extended discussion as to how abortion should be handled. This article will try to lay out some of what I think is required in this discussion.

Babies have rights, gametes do not!

This section heading was called a conclusion by a reviewer, but I think it is a statement of fact. A baby, after birth, has rights: not to be killed; not to be left out in the weather; provided with the food and protection required to thrive. However, a baby does not have the right to decide to eat candy for lunch, drive a car or vote. As a baby grows and matures, it obtains more rights and abilities. This progressive increase in rights and abilities is protected by law. In many places at age 16, this baby, now a youngster, is given the right to drive a car on a public highway. The baby has the right to be president of the United States only after the age of 30. The question is when should the law give certain rights to a fetus, that will soon be a baby? We give no rights to gametes, (sperm and eggs). We can kill them at will. We can flush them down the toilet without a second thought, killing them in the millions without the law prohibiting this. No one objects to killing genetically complete diploid cells when a tumor is surgically removed. What about amputation of an arm or leg? What about the amputation of breasts or testis? When in the process going from gametes to a baby should we restrain the freedom to kill at will? Another words, when should abortion be allowed, regulated, or prohibited? Hopefully, this article will explore this topic away from the political rhetoric that has unfortunately engulfed it. But first the process of pregnancy is outlined.⁴ The story of a life within a life, of the fetus within the mother.

Pregnancy

The details of this discussion of pregnancy were supplemented from the website⁴: <https://my.clevelandclinic.org/health/articles/7247-fetal-development-stages-of-growth>, last updated 03/19/2024.

The first stage in the development of a baby is formation of the zygote, the entry of a sperm nucleus into the egg. This sets the genotype of the resulting embryo and consequently has provided a marker for some people to say that this is the stage when legal protection should begin. An abortion terminates the life of a developing zygote. So, anti-abortion advocates argue that abortion is murder.

The definition that zygote formation as the start of protected life has many problems. 1. The genes from the sperm are not activated until many cell divisions later. Should the stage for legal protection be delayed until the genome is fully active? 2. The genomes of identical twins are identical. Does this mean that identical twins are not separate individuals, even though they function separately, and, if one killed, it is not murder because the other one is still alive? Are clones different individuals? Perhaps functional independence (after the fetus is born) is a better definition of when legal status should be applied? Before that the fetus is dependent on the mother. 3. Using genetics to define individuality has problems. The difference between two individuals from the same population is only partially determined by genetics,

between 10-40%, depending on the trait. The environment is more important in creating individuality than genetics. Even though by profession, I am a population geneticist, I do not think that defining humanity by genetics is correct or even useful. For example, races are defined genetically by skin color and facial features. Are these the important characteristics that we want to use to define humanity? I will come back to the question of the zygote being a human being with rights after discussing the process involved in pregnancy.

A pregnancy lasts about 9 months or 40 days, counting from last normal menstrual period.⁴ Usually, this period is divided into 3 three-month periods. While this is often useful, for our purpose it is better to divide pregnancy into three developmental periods. These are the **Germinal** (from fertilization until implantation in the uterus, about two weeks); **Embryonic** (the period when the organs develop, from week three to week eight); and **Fetal** (the period when the fetus develops characteristics such that it can live outside the womb of the mother, from week nine to birth at week 40).

Germinal stage. The germinal stage is the first two weeks after the formation of the zygote when the zygotic cells divide to form a ball of cells and travel down the fallopian tubes to the uterus where it implants. Implantation occurs when these cells nestle into the uterine lining and rupture tiny blood vessels. The connective web of blood vessels and membranes that form between these cells will provide nourishment for the developing fetus for the next nine months. It is estimated that 60% of the zygotes fail to implant. What does it say about the humanness of the zygote when most of them fail to implant and consequently do not go on to become babies? If the implantation happens on a tissue other than the uterus (in about 1% of the pregnancies)⁴, it develops into an ectopic pregnancy. Ectopic pregnancies do not result in viable babies because the fetus cannot get enough nutrition to develop properly. The growing fetus implanted in the fallopian tubes can rupture of the tube and cause internal bleeding. When this happens, it is a true medical emergency. Ectopic pregnancies that are discovered early can be terminated using drugs. Otherwise, they are best terminated by a surgical abortion, justified as required for the health of the mother. Often this is not clear in laws that ban abortions and so put the woman at considerable risk of either dying or becoming infertile.

Embryonic stage (see Moore et al⁷ for a book on human embryology. This is an advanced scientific book. For a primer, go to the children's section of your local library). As the cells multiply during the germinal stage, they separate into two distinctive masses: the outer cells will eventually become the placenta, while the inner cells which will form the embryo. During the first stage in embryo genesis, the three cell layers develop (third week). The **Ectoderm** (giving rise to the skin and nervous system), the **Endoderm** (the digestive and respiratory systems), and the **Mesoderm** (the muscle and skeletal systems).⁴

At about the fifth week of pregnancy, the hormones associated with pregnancy ramp up so that at-home pregnancy test will register as positive. This is about the time women feel the symptoms of pregnancy. A woman

realizing she is pregnant at five weeks has hardly enough time to organize an abortion if abortions are banned after six weeks. At 5 weeks the neural tube forms and heart cells start to pulse and by week six "heartbeat" can be determined by vaginal ultrasound. For some people, this is the defining characteristic of when an embryo should be considered human by the law and prohibit abortion after this time. This is the developmental stage that justifies the ban on abortion after six weeks.

By week 8 the major organs and body systems start to develop, and the umbilical cord is fully developed allowing a good supply of oxygen to the rapidly growing embryo. At the end of the eighth week the embryo is about the size of a black bean.⁴ After this point, the embryo is usually called a fetus.

The third month (weeks 9-12) is a period of rapid growth and development. The fetus develops distinctive facial features, limbs, bones and muscles and the circulatory, digestive, and urinary systems. By this time the fetus is drinking and peeing amniotic fluid.⁴ After week 12, the rate of miscarriage drops, morning sickness abates, and the fetus is about the size of a plum, 2.5-3 inches.⁴ Maybe this is the time when a fetus should be given some rights. But what rights? The right of life unless that right interferes with the right of life and the right of future fertility of the mother? This is at the end of the first trimester of pregnancy, at about week 12, and the earliest time one might consider giving rights to the fetus. Clearly, this is an issue for discussion.

The second trimester (weeks 13-26) is often thought of as the best part of pregnancy. The morning sickness is likely gone, and the discomfort of early pregnancy has faded, and the discomfort of later pregnancy has not yet started when the fetus presses on the bladder and weighs a lot sticking out there in front. At the end of the fourth month, week 16, the fetus is still small, about 5 inches long and weighs about 4 ounces (about the size of an avocado).⁴

Usually around weeks 18-20 the fetus starts moving around. This is called quickening and is often taken as the indication that the fetus should have some rights and not be eliminated without good reason by abortion. This is also the time an anatomy scan is usually done by ultrasound. The anatomy scan is to check the physical development of the fetus, looking for birth defects. Birth defects range from easily correctable by modern surgery (clef lip) to fatal developmental anomalies. This is the time when most people find out the sex of the fetus.

At the end of the 5th month, week 20, the fetus is 9 to 10 inches long and weighs about a pound.⁴

This is when the areas of the brain associated with the five senses develop.

Month 6 (weeks 21-24). A fetus born in the 6th month is considered premature, but a fetus born in week 23 can survive with intensive care.⁴ This not a practical marker of when a fetus should be considered a normal healthy baby. Up to the 37th week, a fetus is considered premature. By the end of the 6th month, the fetus responds to sound by moving or increasing its pulse. The lungs while fully developed are not ready to work outside the womb. At the end of the sixth month the fetus is about 12 inches long and weighs about 2 pounds.⁴

Month 7 (weeks 25-28). The fetus matures, responding to stimuli and moving frequently, and starts to develop reserves of body fat. At the end of the seventh month, the fetus is 14 to 15 inches long and weighs between 2 and 3 pounds.⁴

Month 8 (weeks 29-32). The fetus adds body fat, and the brain rapidly develops. By week 30, the fetus can control its own body heat. By week 32, except for the lungs and brain, the organs are well-developed and ready for birth. The fetus is about 17 to 18 inches long and weighs as much as 5 pounds.⁴

Month 9 (weeks 33-37). The ninth month is mostly about getting fetus ready to be a fully viable baby, ready to face the world. The brain continues to grow and will grow more after birth. Babies born during this period can have breathing problems and it is not recommended that a scheduled C-section (short for birth by a cesarean operation) be done during this period. At the end of the ninth month, the fetus is 17-19 inches long and weighs 6-7 pounds,⁴ not an unreasonable length and weight for a new baby.

Month 10 (weeks 38-40). During this period, birth should take place. Unless something really terrible happens, no abortions should happen during this period. An emergency C-section might be necessary to preserve the health and fertility of the mother or the life of the baby during a difficult delivery. I feel about full-term abortions like I feel about infanticide. It should not be done! Abortions this late are the fevered dream of anti-abortion propaganda, and it is not clear how often they are done. Maybe a law should be proposed that ban abortions after week 37? At week 40, the birth is full term, and the new baby should be about 18-20 inches long and 7-9 pounds. This ends my short description of a pregnancy that produces a healthy mother and a healthy new baby. Many pregnancies do not end this way. Many end in the death of the fetus. How do we think about this end of a pregnancy? A D&C operation (Dilation and Curettage) is to remove tissue from the uterus after a miscarriage or abortion or investigate the cause of bleeding from the uterus.

Miscarriages and Stillbirths.

10-15% of **known** pregnancies end in miscarriages (spontaneous abortions), most during the first trimester. Many of these miscarriages are caused by genetic abnormalities. This 10-15% does not include unknown deaths of the zygote before implantation and after implantation up to about the 5th-6th week. Estimates of the percentage of zygotes that fail to implant is in the range of 50-60%. Clearly, nature is wasteful at this stage with maybe one third of the fertilized zygotes progressing to term, the other two thirds aborting. My mother had a late miscarriage, technically a stillbirth (a miscarriage after 20 weeks), of a fetus that would have been my younger brother. At 90, she was still mourning this loss, even though she had two later successful pregnancies. A miscarriage often requires a D&C operation. Government officials where there is a ban on abortions can charge the woman undergoing a D&C operation after a miscarriage with breaking the law. Anti-abortion officials can definitely interfere with a

woman's health! Most women that I have talked to regret having an abortion, even one early in pregnancy, but feel it was the best choice given the circumstances. No one that I know used abortions as a means of birth control. The hostility toward women by "prolife" advocates seems unwarranted: women do not get abortions for the fun of it. If economics is one of the major reasons for getting an abortion and if people definitely wanted to reduce the number of abortions rather than attacking women, then I do not understand why the "prolife" advocates have not proposed that the sperm donor be required to help financially support the future child. Unlike the problem in the Scarlet Letter⁵, the sperm donor can be definitely identified using DNA technology.

IVF (in vitro fertilization)

IVF is used to help women become pregnant who have trouble becoming pregnant for many different reasons. It involves harvesting live eggs from the woman, combining them with sperm from the partner to form zygotes. These zygotes can grow and divide in laboratory culture to form a blastomere, a ball of cells at the end of the germinal stage, ready to implant in the uterus of a woman to start a pregnancy. This ball of cells can be successfully frozen to be used later. IVF is a procedure where the germinal stage is carried out in laboratory rather than within the body of the woman. Multiple balls of cells are grown and frozen, each from a different egg and sperm. Each ball of cells can be tested for mutations present in the couple and for chromosomal abnormalities. A blastomere with chromosomal abnormalities or harmful mutations would then not be used for implantation. The argument about IVF is that each ball of cells can become a baby, so killing a blastomere is like killing a baby. So, the blastomeres must remain frozen in the laboratory indefinitely, even though at this is the stage in the development of a baby, most of the blastomeres do not go on to become babies. The requirement to keep the blastomeres frozen indefinitely is such an onerous requirement that it serves nearly as a ban.

This banning IVF is a clear example of when a well-formulated precise definition makes a mess of the discussion and harms life rather than provides clarity for action. One of the major objectives in philosophy, law, and science has been to have clear and distinct definitions of various terms. However, this objective can easily lead one astray when dealing with the real world. Haploid eggs and sperm unite to form a diploid zygote which will become an individual person. Thus, the simple clear definition of the origin of an individual, of a different person, is when this zygote forms. Thus, killing the zygote and the following embryo is murder of a child, just like infanticide. Many of these balls of cells do not implant in the uterus and don't become babies. Seems that nature feels these balls of cells are expendable. Why create such trouble in the life of people that need a baby for a clear precise definition but unreasonable definition of what it means to be human?

When I was in high school, I had a summer job as an operating room orderly at 75 cents per hour. My major duties were to bring dirty laundry down from and clean laundry up to the operating rooms; to get patients down from the wards and back up; and to fill in the paperwork

for every patient admitted to the recovery room. The billing forms were obviously important, but I also had to fill out two bound books which seemed to serve no purpose. When I asked the senior, experienced head nurse why we had to fill out these books, she said that some time ago two different doctors wanted data for some project they were doing and had probably forgotten about. But even yet we had to continue collecting the data, just in case. When filling out these forms, the surgical procedure named was often a D&C, a procedure to remove tissue from inside the uterus after a miscarriage or an abortion. These D&C operations were also have been used to end ectopic pregnancies. Women's health concerns were being taken care of in the twilight and not talked about. One story I remember, an aunt was dying painfully of cancer. The family got a bottle of morphine and overdosed the aunt. A policeman called in to certify the death, looked at the half full bottle with a fill date of only two days before, opened the bottle, saying this is no longer needed, and poured the rest of the morphine down the toilet before signing the death certificate. Now, as both abortion and assisted death are being brought into full view, we need an intellectual and moral grounding of how to handle these medical emergencies. Both the origin and the death of a person are processes that do not have easy markers of start and end.

Abortion and the rights of a fetus.

The simple answer to when human life begins is during the formation of the zygote. This leads to the cruel proposal to ban all abortions. After implantation and until birth, the lives of the mother and the fetus are literally intertwined. Sometimes, the life, health, and fertility of the mother can only be saved by ending the life of the fetus.

My answer is that rights of the fetus accumulate over time. Gametes have no rights. Zygotes have no rights. The balls of cells before implantation have no rights. I am proposing that the implanted embryo have no rights until the 18th to 20th weeks of pregnancy when quickening occurs. I take quickening, the feelings from the movement of the fetus independent of the will of the woman, gives an existential awareness by the woman of the independence of the fetus. At this time, the fetus should have some rights. Thus, I propose that abortions should be simply the decision of the woman, based on her judgement of the situation, until week 18. After the ultrasound done in week 18 (a procedure that should be provided by the government), the decision for an abortion cannot any longer be simply done by the woman. The fetus has a right to life unless there is an agreed upon reason for an abortion.

For example, during this ultrasound procedure, the sex of the child can be determined. No abortion should be done because of the sex of the fetus was not the one the mother wanted. Just because the mother likes little girls, is not a reason for aborting a boy. If the first-born son is important in society, it is likely that there will be more abortions of girls than boys leading to more boys than girls, an unbalanced sex ratio and the problems that causes society. This cannot be a reason for aborting a girl. On the other hand, a fetus with deadly congenital anomalies, like microcephalia, would be a reason for an

abortion. The list of allowed anomalies will have to be determined by society through custom, discussion and finally law, with the caveat that the mother's desire not to have an abortion must be determinative. There cannot be law saying that a certain condition, like Downs syndrome, is too expensive for society and therefore an abortion is required. How we decide what is reason for an abortion at this stage is a very touchy issue which is likely to be decided differently in different cultures.

An abortion ban

It seems to me that a stated ban on abortions after viability, say at 35 weeks, is needed to emphasize that allowing abortions is not encouraging infanticide. This date is just a guess at the appropriate time for an abortion ban. Most likely, if an abortion becomes necessary because of problems with either baby or mother, a Cesarean section could be done instead of an abortion. If it is clear the fetus is dying, what should be done? I don't know. Experience should inform us!

An abortion ban is necessary because rules are likely to be fudged such that living babies are aborted. A rule that cannot be fudged easily (no abortions after week 35) is needed. Fudging is universal!

Proposal

My proposal on abortion stems from the fact that pregnancy involves the intimate, inseparable contact between two linked individuals. One, the mother, starts out with rights and importance. The other, the fetus, starts out without rights and of very little value. The rights and value of the fetus increase during the pregnancy. If the contact must be separated by abortion before the fetus can survive alone, what are the parameters allowing this separation?

1. Abortion should be allowed without restriction for the first part of pregnancy. I set this period up to 18 weeks when the first movements of the fetus are felt by the mother. Up to this point, the pregnancy is more theoretical, while there are physical symptoms of the pregnancy like morning sickness, but there is no noticeable independent activity of the fetus. During this first period, the woman can decide to have an abortion for various reasons, from not to have stretch marks on the abdomen to finishing an education; from continuing to work uninterrupted to not being able to afford another child; from ill health to trauma of rape and incest. The women that I talked to were sad to have had an abortion but would do it again given the circumstances. The men who want to ban abortions do not seem to believe women are serious about life and death, about family and future.
2. After the ultrasound observation of the fetus at about 20 weeks and after quickening, the fetus should have the right not to be killed without good reason. The list of good reasons will have to be developed through discussion and experience. The baby is of unpreferred sex is not a good reason. My husband lost his job is not a good reason at this stage. The fetus is dying, the mother's health is in danger are good reasons. I expect different cultures will have somewhat different lists of what are good reason for an abortion this late. Different medical providers will have different opinions as to what are good reasons. Also, either for money or conviction, some providers will bend the rules to the breaking point. The possibility of people

like that should not prevent culture from developing fair and human rules about abortions after 20 weeks.

3. After the fetus is basically ready to live independently of the mother, abortions should be banned. At this time in the pregnancy and the fetus cannot live but a short time after birth, an abortion verges on mercy killing. Mercy killing is not being considered in this essay.

This proposal is a guess on my part and the more I work on this essay, the more I realize that my expertise is inadequate. But I think that either banning abortions or allowing abortions to be freely performed are the extremes and something in-between is required. What is allowed and what is prohibited, should be open to discussion. My proposal is that abortions should be freely allowed up to 18 weeks, from 19-34 weeks abortions should be allowed in consultation with health professional for a good cause related to the health, welfare and fertility of the woman and the viability or lack of viability of the fetus. After 34 weeks, abortions should be banned.

Summary

The idea that the blastocysts produced during IVF are equivalent to babies means that anyone that accidentally kills blastocysts while handling them in culture could be tried for murder. This essay was started because I found this proposal from the Alabama supreme court² weird and wrong. A procedure that provided children for families that desperately wanted them is discouraged because of a definition of when, during the process of generation of a new individual person, personhood should be granted with the accompanying legal rights. The definition used in Alabama is when the zygote forms. The definition has some logic if one accepts that there is a particular stage during development when personhood is granted with all the legal rights. Instead, I am proposing that rights should be granted as the fetus develops. This is what we

usually do. We grant rights as a person develops, learns, and becomes competent at doing a task. In this essay, I have divided pregnancy into three periods: the first 18-20 weeks where abortion is allowed given the wishes of the woman (no abortions can be done if the woman objects); The period after quickening and the first major ultra-scan from about week 20 to 35 abortions are allowed for medical reasons; after about week 35 abortions are banned to forestall criticisms that my plan is to kill babies. The pregnant woman and her health should be the primary concern during pregnancy, not the embryo.

Post Script

I think trouble with abortion arises because we think of God as a mechanic rather than a gardener. At least since the time of Newton, the universe is viewed as a machine, forgetting that Adam (man) was a gardener. The importance of this was emphasized by Jim Stump⁸ in his new book. He was raised as an evangelical and discussed evolutionary biology with various creationists. If you accept the scientific finding that man is a late arrival in evolutionary time, then what was God doing with all this time before he gets to the main star of the show, mankind? Jim Stump⁸ suggests that God was having a great time allowing the development of creation to proceed with freedom. Like a good gardener, God controlled the development of the garden within which plants lived, reproduced, and evolved. God did not make all the species of organisms like one makes cars, horseshoes, and dresses. Rather he creates the conditions for a proliferation of life. Creation is described as good because it allows a flourishing of life, allowing the development of ethical, loving creatures. The position of the Alabama Supreme Court is not a loving position, rather a logical conclusion from an incorrect premise.

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