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SETTING THE BOUNDARIES OF INDIVIDUAL REPRODUCTIVE AUTONOMY: THE CASE OF ARTIFICIAL WOMB

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ABSTRACT

Artificial womb or ectogenesis may sound like science fiction at present. Nevertheless, research on this technology is moving rapidly and it is anticipated to be ready for human testing in years to come. Although not yet a reality, early discussion on the legal and ethical ramifications of this technology should be encouraged as to ensure that the law is moving side by side with the scientific developments. Therefore, this article undertakes the challenge of identifying and presenting the potential implications of ectogenesis to women, embryos, and society, with special reference to the legal and social backgrounds in Malaysia. The analysis began by applying the theory of individual reproductive autonomy that is commonly relied upon in arguments for the use of assisted reproductive technologies. It is argued that reliance on the notion of individual reproductive autonomy permits the use of ectogenesis provided that no harm is caused to

others. Following that, the possible harms or concerns surrounding ectogenesis were carefully presented. This article concluded that more detailed deliberations on the use of ectogenesis are required before an affirmative legal stance can be reached on its permissibility. This article is significant as it paves the way for more research in this area particularly from the Malaysian perspective.

Keywords: Bioethics, medical ethics, individual reproductive autonomy, artificial womb, ectogenesis.

INTRODUCTION

Artificial womb or also known as ectogenesis is not a new concept nor is it science fiction.¹ The technology has long been debated, and several scientific research have been attempted by scientists worldwide. Among those was the first discussion on artificial womb dated back to 1923, whereby an English biologist, J.B.S. Haldane, introduced the idea of fertilising women's eggs outside the womb (Schwartz, 2019). Another scientific attempt at the technology was also reported by a Japanese researcher, Dr. Yoshinori Kuwabara of Juntendo University, whereby he succeeded in gestating goat embryos in a machine that contained amniotic fluid (Chemaly, 2012). In 2003, another scientist, Dr. Helen Hung-Ching Liu, managed to grow a mouse embryo and later, a human embryo for ten days in an artificial womb. Nevertheless, her research was barred by laws that set a 14-day limit for research on human embryos (Chemaly, 2012).

Another breakthrough experiment that is more recent was an experiment on creating artificial wombs that took place in 2017, where researchers from the Centre for Foetal Research at the Children's Hospital of Philadelphia, the United States of America (USA), gestated premature lambs born after 110 days of gestation in an artificial womb consisting of a plastic bag with fluid. In this attempt, the lambs survived and grew for another four weeks (Morley, 2017). Researchers are now optimistic that artificial wombs would be ready for human testing within five to ten years (2025–2030)

¹ In this article, the terms “artificial womb” and “ectogenesis” are used interchangeably.

(Romanis, 2020). According to Solerte (2020), if the technique is successful, it would significantly improve the chances of survival for premature babies born before 28 weeks of gestation. As such, critical analysis on the potential issues that may arise from this technology is timely and this article contributes to this discussion particularly from the Malaysian social and legal perspectives.

HOW AND WHY?

The word “ectogenesis” is rooted from two words, namely “ecto”, which means “outside” and “genesis”, which means “development” (Kingma et al., 2020). Therefore, ectogenesis is literally defined as “development outside the body *especially* development of a mammalian embryo in an artificial environment” (Merriam-Webster dictionary). In full terms, ectogenesis is described as the creation of an artificial womb or ectogenetic incubator or device intended to replace the human womb in gestating embryos to full term (Alghrani, 2007). By using ectogenesis, the gestation of human embryos is completed outside a woman’s body as the task is replaced by a machine that acts “as if it were a mother” (Aristarkhova, 2005: 43).

Ectogenesis is mainly intended to serve two purposes: first, to assist women who are unable to carry their own child for medical reasons; second, to help premature babies survive by providing a quasi-uterine environment for them to grow in as the current Neonatal Intensive Care Unit (NICU) is only able to help babies born at 24 weeks (Alghrani, 2007). In this regard, Professor Collin Duncan is reported to state that: “This research is not about replacing the womb in the first half of pregnancy. It is about the development of new ways of treating extremely premature babies” (Morley, 2017). Other than that, ectogenesis may also serve other useful purposes including offering an alternative to existing assisted reproductive technologies (ART) such as surrogacy. Ectogenesis may be preferred over surrogacy due to several possible reasons such as to avoid the custody battle that often occurs when surrogacy is employed and to prevent exploitation of women. In addition, the cost of using ectogenesis might be slightly reduced as compared to the cost involved in hiring a surrogate mother (Tumanishvili, 2017). Furthermore, ectogenesis may provide a healthier and safer environment that is, for example, free from drugs

or alcohol for foetuses² to grow in (Chemaly, 2012). With natural pregnancy, the foetus is totally dependent on the mother to develop healthily inside her womb. Although most pregnant women would do their best to protect their pregnancy, there is always a possibility that some women might not be able to do that for whatever reasons (Wellin, 2004). Therefore, ectogenesis is anticipated to provide a safer and conducive alternative for the foetus to develop to full term. Ectogenesis is also hoped to offer an alternative to abortion without terminating the foetus' life. Unwanted pregnancies need not be terminated with the use of ectogenesis as the foetus may be transferred to this artificial womb and allowed to survive until birth. Besides that, it is posited that ectogenesis may offer a solution to gender inequity in reproduction by relieving women from the burdens of pregnancy and childbirth (Seppe, 2020).

Arguments in support of ectogenesis are premised on the notion of individual reproductive autonomy. Proponents of this theory argue that individuals should be allowed to exercise their autonomy in making their own reproductive decisions so long as no harm is caused to others (Zeiler, 2004). Therefore, this article critically investigates the application of individual reproductive autonomy in the context of ectogenesis. The reasons and benefits of allowing ectogenesis are explored and weighed against the potential ramifications that may be caused by the technology, with particular reference to Malaysian society. First, the notion of individual reproductive autonomy is carefully presented and applied.

INDIVIDUAL REPRODUCTIVE AUTONOMY

The word “autonomy” is literally defined as “the ability to make your own decisions without being controlled by anyone else” (Dictionary.cambridge.org). The principle of autonomy is one of the main theories in medical ethics propounded by Beauchamp and Childress (2013), which requires autonomous decisions made by competent adults be respected and not interfered with. In summary, respecting individual

² After eight weeks of conception, the embryo is scientifically referred to as a foetus. See Oxford Concise Medical Dictionary (1988: 244). In this article, the term foetus is used to refer to the human embryo from this stage onwards for scientific accuracy.

autonomy entails individual decision-making on matters central to their lives that are to be honoured and not restricted. The principle of autonomy has been expanded to the area of human reproduction and is often termed as ‘procreative liberty’ or ‘reproductive autonomy’ (Zeiler, 2004). For example, Dworkin (1993: 148) described the notion of reproductive autonomy as “A right to control their own role in procreation unless the State has a compelling interest for denying them that control”. According to Dworkin (1993: 166), individuals should be given “...the moral right and the moral responsibility to confront the most fundamental questions about the meaning and value of their lives for themselves, answering to their own consciences and convictions”.

The notion of reproductive autonomy has wide interpretations and connotations. Over the years, its scope has been expanded not only to refer to the freedom in avoiding reproduction, but it also encompasses the freedom to reproduce (Robertson, 1994) and the freedom to reproduce using methods that can fulfil one’s reproductive choices (Harris, 2000). Harris (2000: 34) stipulated that reproductive autonomy should include the freedom to “...reproduce with the genes we chose and to which we have legitimate access or to reproduce in ways that express our reproductive choices and our vision on the sorts of people we think it right to create”. Similarly, O’Donovan (2018: 491) argued, in the context of womb transplant, that “[I]f a woman has a strong desire vis-à-vis her reproduction, for example, a desire to gestate, and this holds some value for her, then it will be in her interests to do so in some morally meaningful way”. In the same way, it also arguable that the freedom to reproduce necessarily includes the freedom to reproduce using an artificial womb or ectogenesis if the woman so desires. This argument is premised on the importance of ectogenesis to women, which is examined in the next section.

Nonetheless, the application of reproductive autonomy is not without limits. For example, Robertson (1994: 41) recognised that reproductive choices are conditional and constrained by proof of “substantial harm”. He advocated that:

[I]t will be necessary to distinguish between harms to individuals and harm to personal conceptions of morality, right order, or offense, discounted by their

probability of occurrence...A majoritarian view of “right” reproduction or “right” valuation of prenatal life, family, or the role of women should not suffice to restrict actions based on differing individual views of such preeminently personal issues. (Robertson, 1994: 41)

The argument that individual autonomy should be limited by proof of harm to others is rooted in Mill’s theory of harm that proposed for the application on individual autonomy provided that no harm is caused to others (Collin, 1989). Therefore, it is imperative that any recognition on the application of reproductive autonomy in the use of ectogenesis is to be based on proper evaluation of the potential harms that the technology might cause to others such as women, children, and society. Citing Johnston and Zacharias (2017: 10):

An approach to reproductive autonomy that is broad in scope and deeply attentive to context is necessary for a future in which economic and social inequalities continue to shape individual decisions and a future that includes evermore technologies, such as egg freezing, expanded prenatal testing (including preimplantation genetic testing), and new and expanded assisted reproductive technologies that promise to expand reproductive choices yet risk imposing their own sets of constraints. This future needs a richer approach to reproductive autonomy, one based in an understanding of reproduction as a contextualised process extending before and beyond conception and that works to enable truly free and truly informed decision-making that is, as much as possible, consistent with people’s values and true to their commitments.

In the Malaysian context, it has been further suggested that limitations to autonomy should also be based on the religious perspective on the exercise of such freedom, particularly the Islamic view due to the relationship between law and religion in this country (Yaakob, 2013). The current author has argued elsewhere on the relationship between law and religion in the Malaysian bioethical discourse and the same argument is repeated here in this debate on ectogenesis:

The rapid advancement in bioethics in Malaysia, though applauded, must be carefully regulated so as to safeguard the interests of society and individuals concerned from the harms that may arise. Law, thus, is seen as a useful mechanism to fulfil this arduous task. In formulating laws and policies on bioethics in the multi-cultural and multi-religious society of Malaysia, it has been demonstrated that religion, particularly Islam, has been and is likely to continue to have a predominant impact due to the unique history of the Malaysian legal system, which continues to be incorporated in the country's Federal Constitution. (Yaakob, 2013: xi)

The influence of religion in Malaysian laws is also supported by Farina (2021) who observed in the context of marital rape, whereby one of the reasons underlying the reluctance of law makers to criminalise marital rape as a specific offence is the objection from religious authorities. Therefore, any deliberations on the future legal mechanism on ectogenesis in Malaysia must consider religious perspectives, particularly the Islamic view (Yaakob et al., 2011). Based on this setting, the present article undertakes the task of ascertaining and examining the potential implications of ectogenesis to women, foetuses, children, and society.

AN UNNATURAL ACT

Scientific discoveries are often welcomed with objections to the nature of the act (Yaakob, 2019). Some bioethicists strongly feel that it is wrong to change the natural process in life. Kass (1998: 19), for example, believed in the value of naturalness when arguing against cloning. According to Kass (1998: 19):

In this age in which everything is held to be permissible so long as it is freely done, in which our given human nature no longer commands respect, in which our bodies are regarded as mere instruments of our autonomous rational wills, repugnance may be the only voice left that speaks out to defend the central core of our humanity. The goods protected by repugnance are generally overlooked by our customary ways of approaching all new biomedical technologies.

The same argument has been echoed in the debate on ectogenesis whereby Digregorio (2020) stated that:

Even outside of the abortion debate, the idea of what is “natural” seems to matter more when it comes to pregnancy and childbearing than it does in other medical contexts. “Natural” becomes a way to restrict or police women’s bodies and their choices. It can actively restrict progress in medical intervention in pregnancy, from abortion to IVF.

Arguments concerning the nature of the act is based on the deontological approach to bioethics. According to this approach, an action is judged according to its nature, regardless of its consequences (Davies, 1993). McNaughton (2006: 424) explained that “The production of good is not the only fundamental morally relevant consideration”. As such, individuals should be allowed, or even required, not to aim for good results. Nonetheless, reliance on the nature of the act alone is insufficient as the basis for deliberating on medical technologies, such as ectogenesis. In the discussion on post-menopausal pregnancy for instance, Biggs (2007: 9-10) vehemently questioned:

It is clearly unnatural to use medicine to prevent pregnancy or to use reproductive technology to facilitate pregnancy in post-menopausal women, but it is equally unnatural to use pharmaceutical interventions and reproductive technology to produce any pregnancy. What then makes a post-menopausal pregnancy less acceptable than a technology-induced pregnancy in a younger woman?

It is undeniable that all modern medical interventions are ‘unnatural’; however, most have been tolerated and accepted. Dahl (2004) rightly asserted that as long as the practice does not cause harm to others, individuals should be free to exercise their autonomy in using medical technologies. Taking womb transplantation as an example, the technology was initially condemned on the grounds of unnaturalness when it was introduced to the public. It was reported that a donor felt ‘weird’ at first when thinking of donating her womb to her daughter given the fact that she used the same womb to carry her daughter and it is now being used by her daughter to carry her

grandchild. Nevertheless, that feeling eventually disappeared and she later realised that womb transplantation is just another form of organ transplantation (Roberts, 2011). Now, womb transplantation is being perfected and the repulsion over the practice is reducing (Zaami & Marinelli, 2019). Gosden, too, surmised that the possibility to create life using ectogenesis may surpass the need to preserve nature (Gosden, 2000).

Moreover, everyone has different views and sentiments over the nature of a particular action or medical technology. Some might have no qualms over the act of gestating humans in an artificial womb while others might resent such an idea by holding on to the natural process of human birth. In this situation, Deech and Smajdor (2007, p. 33) rightly stipulated that:

People may hold utterly conflicting moral views and may hold them passionately and sincerely. How can we deal with this fact? While it would be useful to have recourse to some objective measure of morality, we simply cannot know which of two opposing views is morally correct in the way that we can establish which of two factual claims is correct. So, why should we favour certain moral claims over others?

It is, therefore, hard to accept the argument that ectogenesis should not be done merely on the grounds that the act is unnatural without other proof of harm. A careful evaluation on the potential benefits and harms arising from medical innovations must be conducted before a legal stance can be decided. At the same time, the reasons behind the feeling of repulsion over a particular medical technology must not be ignored (Yaakob, 2019). In the following sections, the potential harms of ectogenesis to women, embryos, children, and society are, therefore, explored.

THE VALUE OF PREGNANCY TO WOMEN

It has been argued that women's reproductive autonomy to procreate using ectogenesis should be respected due to the benefits of the technology in relieving women from the burdens and risks associated

with pregnancy and childbirth. Smajdor (2007) applauded ectogenesis on the grounds that the technology relieves women from the burden and risks of pregnancy that may not be motivated by women's own desire to have a baby. According to Smajdor (2007: 336):

In fact, women do not necessarily have children only to fulfil their own biological desires. Society at large may also have an interest in reproductive matters, and it is here that the difficulty emerges. Encouraging women to curb their other interest and aspirations in order to have children at biologically and socially optimal times reemphasises that it is women who take on the risks, whereas society in general profits from these sacrifices. This, I suggest, is a *prima facie* injustice. Yet it is founded on a physical necessity: Babies must be gestated in women's bodies.

Relying on Firestone's (1971: 198) argument that "pregnancy is barbaric", Smajdor (2007) asserted that the invention of ectogenesis is welcomed to reduce social injustices caused by unequal gender roles in reproduction. Chemaly (2012), on the other hand, believed that separating women from their role in pregnancy will cause a more severe repercussion. Citing the opinions of Dworkin and Raymond, she further contended that:

Fertility, and the ability to be the species' reproductive engine, are virtually the only resources that women collectively control...And, although women do have other "value" in a patriarchal society – child-rearing, for example – gestation remains, worldwide, the most important. Even in the most female-denigrating cultures women are prized, if only, for their childbearing. If you take that away, then what? This technology becomes another form of violence. (Chemaly, 2012)

Pregnancy is a crucial aspect in most women's life such that the inability to experience pregnancy may affect their identity as women (Landau, 2007). According to Catsanos et al. (2013), "The uterus represents a symbol of femininity, of women's biological difference from men". The relationship between women and birth represents one of the main "sources of power" for women in certain societies

(Chemaly, 2012). This is particularly so in Asian societies including Malaysia. For Malaysian society, pregnancy and childbearing are unique identities and roles placed on women that are undertaken with pride. This sentiment finds its root in the culture and religious beliefs of Malaysians (Abdullah et al., 2008). Within Malaysian society, a woman's traditional role centres on caring for her children and attending to household chores (Evason, 2016). Women's role in child-rearing is further strengthened by the Islamic stance where Islam places high value on the role of women as mothers surpassing the respect placed on fathers. This position is derived from a Hadith or saying of the Prophet Muhamad PBUH: "O Messenger of Allah! Who is the person who has the greatest right on me with regard to kindness and attention? He replied, 'Your mother'. 'Then who?' He replied, 'Your mother'. 'Then who?' He replied, 'Your mother'. 'Then who?' He replied, 'Your father'." (Osman, 2013).

The high status and respect placed on women are due to their roles in pregnancy and childbirth that are not experienced by fathers (Pejabat Mufti Wilayah Persekutuan, 2019). Therefore, it is arguable that separating women from their role of pregnancy and childbirth may have profound consequences on them from social and religious perspectives, particularly in Asian societies such as Malaysia. As such, the exercise of women's reproductive autonomy in procreating using ectogenesis needs to be carefully assessed in Malaysia to safeguard the interests of women and society. In addition, the act of gestating human embryos in an artificial womb presents several legal questions surrounding the embryos, which are explored below.

LEGAL ISSUES SURROUNDING THE EMBRYO

Unlike other methods of assisted reproductive technologies (ART) such as in vitro fertilisation (IVF) or surrogacy, ectogenesis is distinctive as human embryos may be gestated outside women's womb. It is anticipated that in several more years to come, ectogenesis might offer an alternative to "grow babies from scratch" and represent a choice for women who refuse to undergo pregnancy for any reason whatsoever (Romanis, 2020). The need for pregnancy might be eradicated as human embryos may be conceived via IVF and gestated in an artificial womb until 36 weeks from conception (Romanis,

2019). If this option becomes a reality, then several legal issues will arise and need to be revisited to accommodate this new breakthrough.

The Legal Definition of Personhood

A pertinent legal issue that should be reconsidered is the legal definition of personhood afforded by the law. In the United Kingdom, legal personality is conferred at birth as decided in *Paton v British Pregnancy Advisory Service Trustees* [1979] QB 276. This legal stance has been adopted by the Malaysian courts in several cases. In *Chin Yoke Teng v William Ui Ye Mein* [2005] 2 MLJ 480, the Court of Appeal held that “An unborn child has no legal personality to sue and as far as ‘human being’ is concerned, it means a living human and never been interpreted to include the unborn child” (p. 483). *Chin Yoke Teng* was then referred in another case, *Veelavan Govindasamy v Dr. Haris Hamzah & satu lagi* [2013] 10 CLJ 846 where it was held that “*Seorang bayi yang masih di peringkat janin (fetus) yang belum dilahirkan atau janin yang mati semasa di dalam kandungan ibunya tidak mempunyai keperibadian undang-undang atau personaliti undang-undang untuk mendakwa; Chin Yoke Teng dirujuk*” (p. 853).

If complete ectogenesis is used without involving human pregnancy from the beginning, then the current legal stance on legal personality conferred at birth must be revised in order to provide legal protection to embryos gestated in the artificial womb. In natural pregnancies, the moment of birth is marked when the foetus leaves the womb. However, when artificial womb is involved, the moment of ‘birth’ needs to be redefined. It must be determined whether the foetus is considered born when it is transferred to the artificial womb from its mother’s womb or when it leaves the artificial womb upon complete gestation (Tumanishvili, 2017). Without a clear legal definition, several other repercussions may ensue. Romanis (2019: 3) succinctly explained the importance of establishing legal personhood:

Investigating the law of birth is of crucial significance. Legal personhood signals the extent to which the interests of an entity are worthy of legal recognition. Personhood is the mechanism that affords entities with the rights and protections underlying the entirety of criminal and civil law. Legal personhood also determines the nature of the relationships an entity can have with others.

The conferment of legal personality or personhood will determine the actions that can be taken on the embryo/foetus in the artificial womb. Welin (2004: 622) succinctly explained the significance of birth to humans as follows:

At birth, everything changes. A human being with a full set of human rights enters the world. The child-in-the-family is protected in a radically different way than the child-in-the-uterus. When a born child is abused, society will do something. When an unborn child is similarly abused, society will normally do nothing. There has previously been no possibility of safeguarding the interests of the foetus without the infringement of the rights of women.

Wellin (2017) felt that in pregnancy using ectogenesis where the foetus is not part of the woman's body, the foetus should have the same legal rights and protections that are accorded to newborn babies. If this argument is accepted, then the law on abortion needs to be revisited.

The Law on Abortion

If artificial womb becomes available, the legal definition of abortion will have to be redefined. In the abortion debate, women are seeking to terminate their pregnancy and end the life of the foetus. On the contrary, by transferring a foetus to an artificial womb, it is questionable whether the woman can request for the life of the foetus to be terminated (Alghrani, 2007). Singer and Wells (1987) contended that "Freedom to choose what is to happen to one's body is one thing; freedom to insist on the death of a being that is capable of living outside of one's body is another". Even proponents of the right to abortion claim that abortion involves "a right of evacuation" and not "a right of termination" (Alghrani, 2007: 197). Before the advent of ectogenesis, removing the foetus from the mother's womb would inadvertently result in the death of the foetus as it is not capable of surviving outside the womb. When ectogenesis becomes available, an important question arises in the event that if the pregnant woman wishes to end her pregnancy, does she have the right to demand for the termination of the foetus' life as well? It must be determined whether such an act falls under the offences against the foetus provided in the Penal Code.

Malaysian law criminalises abortion at *any* stage of the pregnancy, as stipulated in Section 312 of the Penal Code, which provides:

Whoever voluntarily causes **a woman with child to miscarry** shall be punished with imprisonment for a term which may extend to three years, or with fine, or with both; and if the woman be quick with child,³ shall be punished with imprisonment for a term which may extend to seven years and shall also be liable to a fine.⁴

Due to the protection granted to the foetus, abortion is only allowed in Malaysia where it is performed by a registered physician if he/she:

...is of the opinion, formed in good faith, that the continuance of the pregnancy would involve risk to the life of the pregnant woman, or injury to the mental or physical health of the pregnant woman, greater than if the pregnancy were terminated. (Section 312 of the Penal Code)

From the above provision in the Penal Code, it is evident that the law only protects embryos in utero or embryos inside the womb as Sections 312–314 of the Penal Code expressly provide for an offence for causing “a woman with child” to miscarry. If transferring the foetus to an artificial womb becomes a reality, it appears that the present law on abortion needs to be revised to accommodate the act of transferring the embryo/foetus to an artificial womb. As seen in the present provisions in the Penal Code, the act of causing miscarriage or abortion is prohibited at any stage of the pregnancy. Therefore, it must be determined whether it is legal for the embryo or foetus to be ‘aborted’ from a woman’s womb and transferred into an artificial womb. Furthermore, it must also be considered whether ectogenesis could end the issue of abortion by mandating all unwanted pregnancies to be continued outside the woman’s body.

³ The meaning of the term “quick with child” is not provided in the Penal. According to Ratanlal and Dhirajlal, *Law of Crimes*, Vol. 2, 23rd ed. (New Delhi: Bharat Law House, 1987), 1236, the said term refers to the “quickening” of the embryo, which means the stage when the embryo starts to show some movements that can be sensed by the mother and this normally occurs at the fourth or fifth month of pregnancy.

⁴ Emphasis added. Note that the Penal Code uses the term “causing miscarriage” in relation to abortion offences.

An Alternative to Abortion?

Alternatively, a possibility arises as to whether all unwanted pregnancies should be replaced with gestation in artificial wombs in order to save the life of the foetus. For example, it was reported that the number of unwanted pregnancies among teenagers in some states in Malaysia is alarming (Ahmad & Md Dahlan, 2017). However, if the foetus continues to develop in the artificial womb, the legal ownership and responsibility over the foetus when it is born must be decided. Another issue emerges as to who owns or have control over the embryo or foetus since women can no longer claim full authority on the grounds that they are gestating the embryo or foetus inside their body (Alghrani, 2007). In the event where the couple separates, the fate of the embryo left in the artificial womb is questioned if both parties cannot come to an agreement on what should happen to it (Alghrani, 2007).

Alternatively, mandating the transfer of all unwanted babies to an artificial womb will cause serious consequences to the woman, the child born, and the society. For the woman, she will have to endure severe emotional burden by having to live with the fact that her baby has been born and is alive somewhere (www.religioustolerance.org). Another grave consequence is that the society will be burdened with the costs of raising surplus unwanted children (Alghrani, 2007). Governments will have to allocate massive funding to care for these unwanted babies by setting up orphanages or offering financial incentives for couples to adopt (www.religioustolerance.org). At present, abandoned children is already a pressing issue in Malaysia, whereby it is reported that the number of children abandoned due to reasons such as the divorce of their parents is increasing since 2016 (Yatim, 2019). One can imagine the social consequences if artificial womb is made available and all unwanted pregnancies are transferred to these artificial wombs and developed until birth. These are some of the potential legal conundrums that will arise once ectogenesis is fully offered.

POTENTIAL IMPLICATIONS ON THE CHILD

Another fundamental concern that may arise from the use of artificial womb is the possible harm on the child born using this technology.

Concerns have been raised that children born via ectogenesis would bond less with their mothers as compared to children born from natural pregnancies. By replacing a natural womb with an artificial one, it is feared that the maternal bond between the mother and the foetus will be compromised and this is likely to affect their relationship. Smajdor (2007: 342) questioned, “And what about the effect on the mother/child relationship? Surely this would be fractured by the removal of the physical bond between them”. Algharani (2007: 206) also raised the same concerns as she queried:

Will the severance of maternal-foetal bond during gestation adversely affect the child later on in life? Increasing knowledge has evolved on the maternal foetal bond during the nine months’ gestation, and the effects of the maternal environment on the foetus, and how it responds to the mother’s voice, moods etc. How would being gestated in an ectogenetic incubator affect the welfare of the child emotionally? Will the absence of listening to a mother’s heartbeat and having that mother-child bond result in the detriment to the child?

On the other hand, it has been suggested that physical gestation and connection between a mother and the foetus will not necessarily guarantee a strong relationship between them and a pure mother’s love. Incidences of baby dumping or child neglect are not uncommon even when the child was carried by her mother to term. Smajdor thus concluded:

Physical gestation of a child is thus neither necessary nor sufficient for the development of a loving parental bond. The permutations of child-rearing in our society are diverse, and it seems dubious to locate some kind of mystic essence of parenthood in gestation and childbirth if neither of these things can be directly associated with the development of the loving bond or with benefits to the child (Smajdor, 2007: 342).

Another legitimate concern surrounding gestation using artificial wombs relates to the physical health of the foetus and child subsequently born. It is also questionable whether an artificial womb can provide all the essential nutrients and environment that the

foetus needs to develop healthily as compared to natural pregnancies (Smajdor, 2007). In sum, several concerns have been identified over the potential harms of being gestated in an artificial womb:

Moreover, we have absolutely no idea how an artificial womb would affect babies physically and mentally. How will they bond with their environment if they come from an artificial one? How would their physical and cognitive abilities develop? (The Medical Futurist, 2019)

Another potential consequence of being born using artificial wombs relates to the child's identity. Page (2017) surmised that an artificial womb could affect the child's right to identity as the child's biological parents might be different from the parents who actually care for him/her. In this case, the child will not have any knowledge on his/her biological descent and genetic characteristics. She concluded that:

The impact of Artificial Womb Technology on the child's fixed identity will, most likely, also impact his/her dynamic identity, which will affect the child's identity in its entirety, and might hamper his/her ability to build him/herself. (Page, 2017)

Furthermore, children gestated in an artificial womb might also feel a sense of 'rejection' if they learnt that they were left in an artificial womb to be developed rather than being carried in their mother's womb. This may leave profound psychological implications on the children (Yaakob et al., 2011). In the circumstances, further research on the implications of ectogenesis to the child born is crucial before the technology can be applauded and accepted.

ACCESS TO ECTOGENESIS

As with other methods of ART, the issue of access to artificial womb represents another germane concern that needs to be evaluated once it is ready for human use. Apart from offering another alternative to existing ART methods for women with uterus problems, ectogenesis is also potentially available to transgender, single men, and same-sex couples (The Conversation, 2019). The idea of human gestation outside the maternal body may seem most compelling to single men

due to their natural inability to gestate embryos. At present, single men wishing to reproduce may only achieve that goal by turning to surrogacy (Tumanishvili, 2017). As more single women are starting their own single-parent family, it appears that single men too should be given the same opportunity (Tumanishvili, 2017).

In Malaysia, access to ART is available to heterosexual married couples only. There is no law that indicates this restriction although it is claimed that the law is currently underway (Meikeng, 2015). The Malaysian Medical Council (MMC) (2006) has, however, issued a Guideline on Assisted Reproduction and under Section 2, of which it is stated that:

The sanctity of marriage and the importance of marriage prior to having children is a widely held belief by society in Malaysia. The difficulty of forcing potential patients to prove their marital status and maintaining constant checks on the same must be realised as a practical difficulty for medical practitioners. Be that as it may, in this country, assisted reproduction techniques must only be offered to married couples.

The issue of access to ART for single parents and same-sex couples in Malaysia has been analysed earlier where it is concluded that:

Nonetheless, to conclude that same-sex couples and single women should be allowed access to ART in Malaysia is premature without examining the Islamic analysis on the issue. In the Malaysian context, reliance on the harm principle advocated by Mill in restraining individual reproductive autonomy arguably includes harm to society caused by breach of religious tenets particularly Islam. (Yaakob, 2020: 39)

From the Islamic perspective, it is abundantly clear that reproduction is confined to heterosexual couples only (Jakim, n.d). Therefore, the same analogy can be applied to reproduction using ectogenesis. It is high time that a law regulating ART is passed in Malaysia to accommodate the swift development in ART such as ectogenesis, as the existing guidelines issued by MMC are only applicable to public

healthcare providers. Private healthcare facilities offering ART are left to be governed by their own guidelines.

CONCLUSION

Ectogenesis or artificial womb is a prospective innovation in ART. This technology offers huge potential benefits particularly to premature babies as it provides them hope of survival. Nonetheless, scientific endeavour comes with its own perils. Ectogenesis also carries several probable ramifications to women, embryos, the children born, and society. This article has, thus, undertaken the task of identifying the possible harms and benefits of ectogenesis. The discussion began with the application of the principle of individual reproductive autonomy that primarily allows individual decision-making in reproductive issues such as the use of ectogenesis. However, such approval is not without limitations where it is argued that the exercise of individual reproductive autonomy should be limited on proof of harm to others such as women and children. Additionally, it is arguable in the Malaysian context that the meaning of harm should be expanded to include breach of religious tenets as it is suggested that religion, especially Islam, plays an influential role in bioethical discourse in this country. Based on this premise, the concerns and potential harms surrounding the technology on women, embryos, the children born, and society have been identified and briefly presented. It is found that if an artificial womb becomes a reality, several existing legal positions concerning the embryos need to be reconsidered to accommodate the new era in human reproduction. Other concerns such as to women, the children born, and society are also in need of further clarification and evidence. Religious authorities are similarly urged to begin deliberating on this technology as it has been demonstrated that religion has a role in shaping the law and policy on bioethics in Malaysia. In conclusion, it is reiterated that as the technique is on the horizon, a detailed debate on the issues involved is welcomed before a legal stance on the technique can be decided.

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